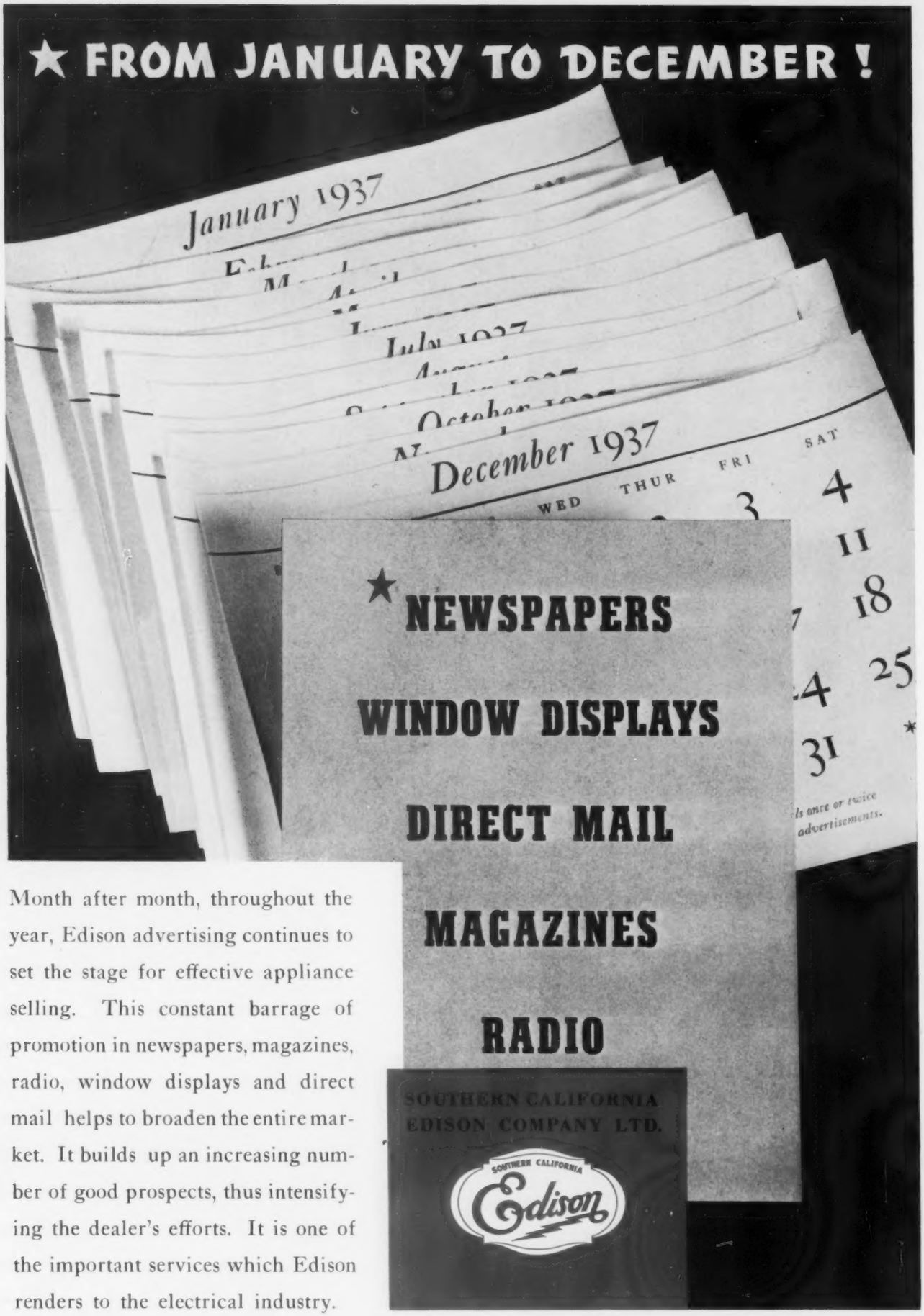
ELECTRICAL WEST

THE ALL-INDUSTRY MAGAZINE OF PROGRESS

December 1937

McGRAW-HILL COMPANY of CALIFORNIA
PRICE TWENTY-FIVE CENTS PER COPY



Month after month, throughout the year, Edison advertising continues to set the stage for effective appliance selling. This constant barrage of promotion in newspapers, magazines, radio, window displays and direct mail helps to broaden the entire market. It builds up an increasing number of good prospects, thus intensifying the dealer's efforts. It is one of the important services which Edison renders to the electrical industry.

ELECTRICAL WEST (with which is consolidated The Journal of Electricity), December, 1937, Vol. 79, No. 6. Published monthly by the McGraw-Hill Company of California, 883 Mission St., San Francisco, Calif. Entered as second class matter at the post office at San Francisco under the Act of March 3, 1879. Additional entry as second class matter at the post office at Los Angeles. Printed in U. S. A. Subscription rate in U. S. and U. S. possessions, and Canada, $2 per year; all other countries $3 gold (thirteen shilling). Single copy, 25c.
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"The All-Industry Magazine of Progress"

ELECTRICAL WEST

MEMBER AUDIT BUREAU OF CIRCULATIONS

WITH WHICH ARE CONSOLIDATED THE "ELECTRICAL JOURNAL," 'THE "JOURNAL OF ELECTRICITY, POWER & GAS," AND THE "JOURNAL OF ELECTRICITY"

ABP

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Established 1887

★

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HIGHLIGHTS

The Realists, says Dr. Adam S. Bennion, are the ones who will save the electric industry. "They know," Dr. Bennion writes in his article on page 20, "that we are still in business—they have a conviction that we are to remain in business—but they ask, 'What can we do about it? What can we best do to restore public confidence?'" The answer is to go to work on the industry's employees —start confidence-building at home.

Pretty girls with shapely legs have been the piece de resistance of most Golden Gate International Exposition publicity. Consequently, few people know how the fair is progressing. On page 22, however, Charles L. Huyck goes about answering your questions concerning the lighting of Treasure Island.

Steam takes precedence in this month's engineering section, page 37. Reported are tests of the water-walled, water-floored, outdoor boiler at Portland, installation of the "package" turbo-generator at Tucson, condenser experience of ten companies.

George C. Tenney, Editor . . W. A. Cyr, Associate Editor
Wayne Snowden, Engineering Editor . Stanley Schuler, Assistant Editor
Roy N. Phelan, Manager . Hans Hjorth, Typography

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883 Mission St., San Francisco, Cal.

Publishers of

ELECTRICAL WEST

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GRAYBAR is uniquely equipped to serve you completely, conveniently, and intelligently. Its 60,000 item service of supply is geared to meet the specialized needs of all branches of the electrical industry . . . Starting in 1869 at the very beginning of electrical development in America, Graybar's experience has kept pace with the growth of the industry. Today, Graybar brings you what you want, when and where you want it. And backs each and every electrical product with a 68 year reputation for quality.

Offices in 83 Principal Cities: Executive Offices, Graybar Building, N. Y.

STICKING RINGS TOOK HIM FOR A RIDE

Read what happened when Shell men stepped in and tackled the problem . . . !

THE superintendent of the Diesel light plant in an Iowa town was fed up! Ring sticking caused by excessive carbon and other deposits was increasing maintenance costs —working his staff overtime!*

The Diesel was taken down—pistons pulled and rings examined. A complete survey of the lubrication system and lubricant was made—nothing was overlooked!

Then—and *only* then—did the Shell men make their recommendation! Shell Talpa Oils for Diesel lubrication—perfected by Shell, working with leading Diesel manufacturers!

Today the plant's records show the result: Production of kw.-hours steadily mounting. Consumption of lube oil markedly cut. And, according to the superintendent: "Our carbon and ring troubles are licked!"

Wherever there is a lubrication problem, the ingenuity and resourcefulness of Shell—backed by a progressive engineering staff—are available for your use. Phone or write your nearest Shell office.

*An actual case history from Shell's files

SHELL'S "INVISIBLE ELEMENT" is a combination of Shell's unmatched world-wide resources; Shell's modern laboratories and refineries; years of cumulative experience in research by Shell's engineers and scientists. It is the determination to make lubrication more efficient, more economical for you.

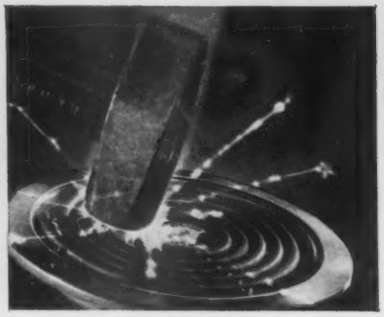
SHELL

SHELL INDUSTRIAL LUBRICANTS

CALROD SETS NEW

PULLED, BENT AND TWISTED

In every conceivable way, Calrod quickly glows with heat when connected up to electric current. Calrod survives every test—again proves its amazing durability.



POUNDED WITH A SLEDGE HAMMER

Calrod's sturdy heating element remained unharmed. Twenty minutes later, when installed in a modern Hotpoint Electric Range, it was cooking a fluffy omelet.

11% to 21% FASTER

Calrod stock units, from regular production, were tested by Hotpoint engineers, in the Hotpoint Engineering Laboratories, under identical conditions with units of other design and manufacture. In every test, Calrod proved that it is the world's fastest durable electric cooking unit—the fastest durable electric cooking unit ever built!

6 TIMES LONGER LIFE

Calrod's superior speed is matched only by its amazing durability. Engineers of Electrical Testing Laboratories, in a series of independent life tests, proved that Calrod has *six times longer life* than other electric range units. Calrod showed an average life of 4,565 hours,* the second best unit an average of only 702 hours, and the third best an average of only 264 hours. Every time—in every test—Calrod's rugged durability was proved beyond dispute.

Sell Calrod Equipped Ranges

Follow Calrod to greater profits in the electric range business. Discover the opportunities that exist in selling ranges equipped with Calrod. Get the facts—today!

WATCH 1938!

For Hotpoint's new and complete line of electric ranges, ready January 1. Thrilling new beauty—a wealth of sensational new features to bring customers flocking to your store. Wait for the Hotpoint line. Get ready to go places with Hotpoint in 1938!

RESULTS OF TESTS

The results shown in the following taole are from the records of Electrical Testing Laboratories. Confirmation, and full details of the tests, may be obtained by writing Electrical Testing Laboratories, New York City.

New 1200-Watt Units Operated at Nameplate Wattage Plus 5% or 1260 Watts

AVERAGE LIFE ON HIGH HEAT

UNIT	LAB. LIFE TEST
Calrod	4,565 hours*
X-1	264 "
X-2	702 "

On the basis of these tests Calrod lasted 6 times longer than the next best unit.

*No Calrod units had failed when these tests were ended.

WORLD'S RECORD for Speed and Durability!

SURVIVES ALL TESTS

Hotpoint's sensational Calrod unit has survived gruelling tests, with speed and durability unimpaired. Calrod is to electric cookery what Mazda is to light. It completely outmodes all previous heating elements and brings modern electric cookery within reach of every home.

BROUGHT TO WHITE HEAT

By blow torch, then plunged into icy water. Sudden changes in temperature in no way affect Calrod's rugged reliability. Calrod easily withstands a thousand times more abuse than would be encountered in years of normal domestic service.

ALL HI-SPEED CALROD UNITS MAINTAIN FULL-RATED WATTAGE FOR LIFE

Calrod leads all other electric range units because it operates at full-rated wattage *for life.* This means its speed and efficiency may be depended upon for years to come—not for today alone. In terms of your business, it means more satisfied customers, negligible service costs, and a solid foundation for your profit structure. Prove Calrod's superior speed to your own satisfaction. Write Hotpoint for full information for duplicate speed tests in your own laboratory. Address the:

EDISON GENERAL ELECTRIC APPLIANCE CO., Inc.

Engineering Department **• 5612 West Taylor Street, Chicago, Illinois**

STEPPED ON BY AN ELEPHANT

Pounded into the earth, Calrod remained uninjured. When connected to an electric circuit, it quickly glowed with heat.

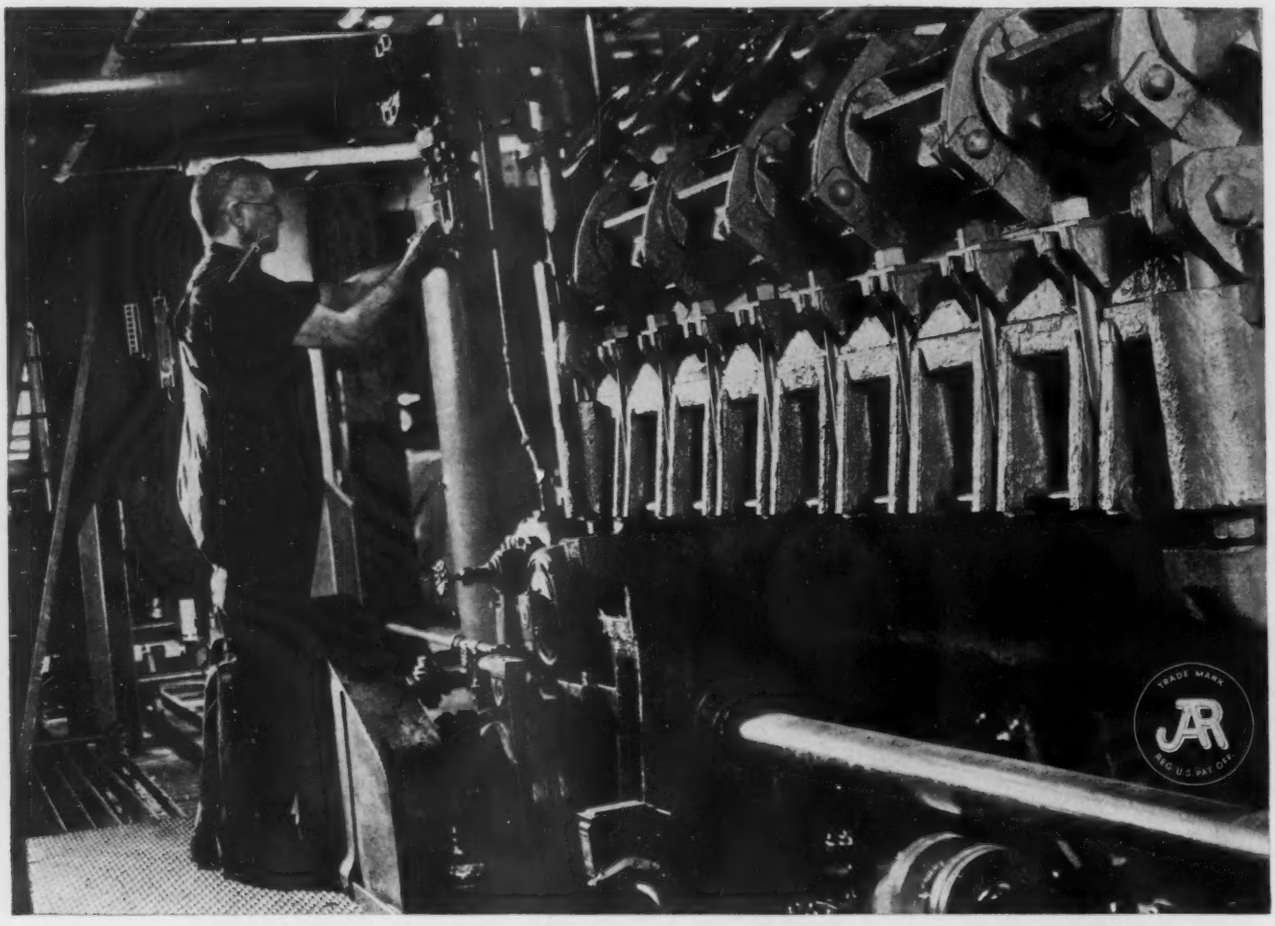
Hotpoint

ELECTRIC RANGES WITH HI-SPEED CALROD

REFRIGERATORS • ELECTRIC RANGES • WATER HEATERS
SANI-SINKS AND DISHWASHERS • WASHERS AND IRONERS

Cable Oil is degasified, dehumidified and decarburized here

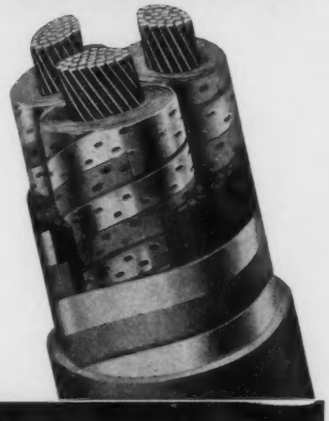
FOR ROEBLING PAPER INSULATED CABLE



SHOWN is the modern equipment which purifies all oil used for impregnating Roebling Paper-insulated Cables. It is typical of the close control under which this power cable is manufactured to assure the utmost in quality and uniformity.

Roebling Type H Impregnated Paper Insulated Cables with graded insulation are made in Single and Multiple Conductor constructions.

We invite your inquiry regarding this cable or any of the more than 60 other types of wire and cable available.



JOHN A. ROEBLING'S SONS CO. OF CALIF.
San Francisco Seattle Los Angeles Portland

ONLY A FINE PRODUCT MAY BEAR THE NAME ROEBLING

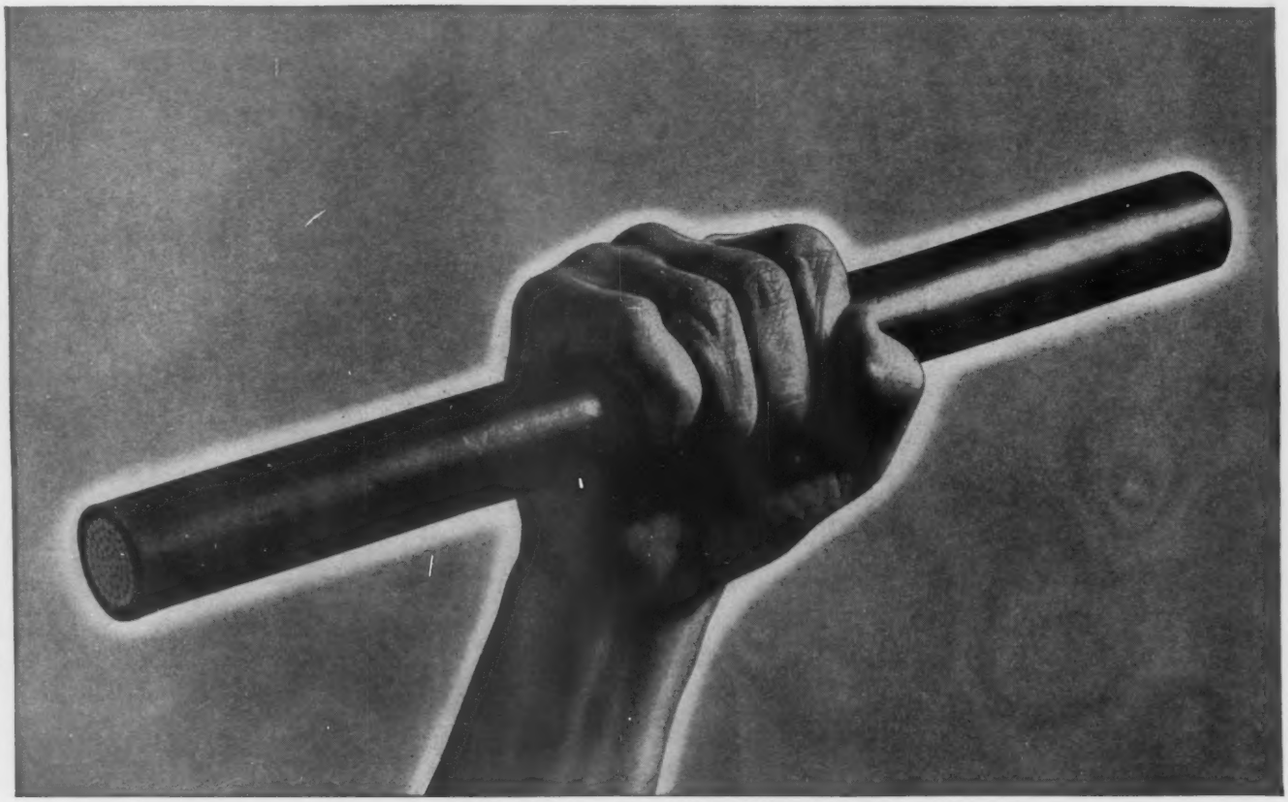
CANNOT BECOME POROUS . . . another high spot in

TODAY'S TREND TOWARD PYREX POWER INSULATORS

PYREX is a Trade Mark and indicates manufacture by Corning Glass Works, Corning, N. Y.

OKOSHEATH

A NON-METALLIC SHEATHED CABLE



Note Its Simplicity

Just a tough rubber belt around the conductor. That is Okosheath. Simple in design—but it *lasts.*

There is nothing to deteriorate and rot away. Enormous quantities of Okosheath, used both in conduit and buried directly in the ground, have demonstrated its durability.

Okosheath is effectually moisture resistant. It is clean, smooth, flexible, light in weight, small in diameter; easy to handle and install. A lineman can splice it. Tough and compact, Okosheath is just the cable for the tough pulls.

Okosheath opens the way for the new trends and demands. Besides lower first cost, it saves in maintenance. The dollar benefits are *both* ways.

THE OKONITE COMPANY
Founded 1878
and
HAZARD INSULATED WIRE WORKS DIVISION

THE OKONITE-CALLENDER CABLE COMPANY, INC.

EXECUTIVE OFFICE: PASSAIC, N. J.
New York Boston Chicago Detroit
Philadelphia Pittsburgh Washington San Francisco
Los Angeles Seattle Buffalo St. Louis Dallas Atlanta
Factories: Passaic, N. J. Wilkes-Barre, Pa. Paterson, N.J.

OKONITE QUALITY CANNOT BE WRITTEN INTO A SPECIFICATION

PRINT IN BINDING

WHERE SPACE IS A DOMINANT FACTOR . . .

the "50,000 Series" Type A Square D Industrial Switch

Here is an industrial switch that possesses all of the best features for heavy duty industrial service.

While the exterior dimensions are smaller than ordinary switches, yet 95% of the box area is available for wiring because the entire base is elevated in the cabinet and is easily and quickly removable.

It has front operation which permits ganging of switches in limited areas and installation in spaces impossible with side operated handle.

Simple, compact, interlock mechanism prevents cover from being opened while switch is in the "on" position and prevents closing switch when cover is open. Positive pressure fuse clips insure highly efficient contact pressure and reduce heating 80% or more.

Double break, quick-make and quick-break at mile-a-minute speed is accomplished by an operating mechanism and compression spring which reduce the burning of contacts to a minimum.

The switch has a porcelain base and many other features that make it a "stand-out."

Like all Square D electrical equipment, it is available through the better electrical wholesalers everywhere.

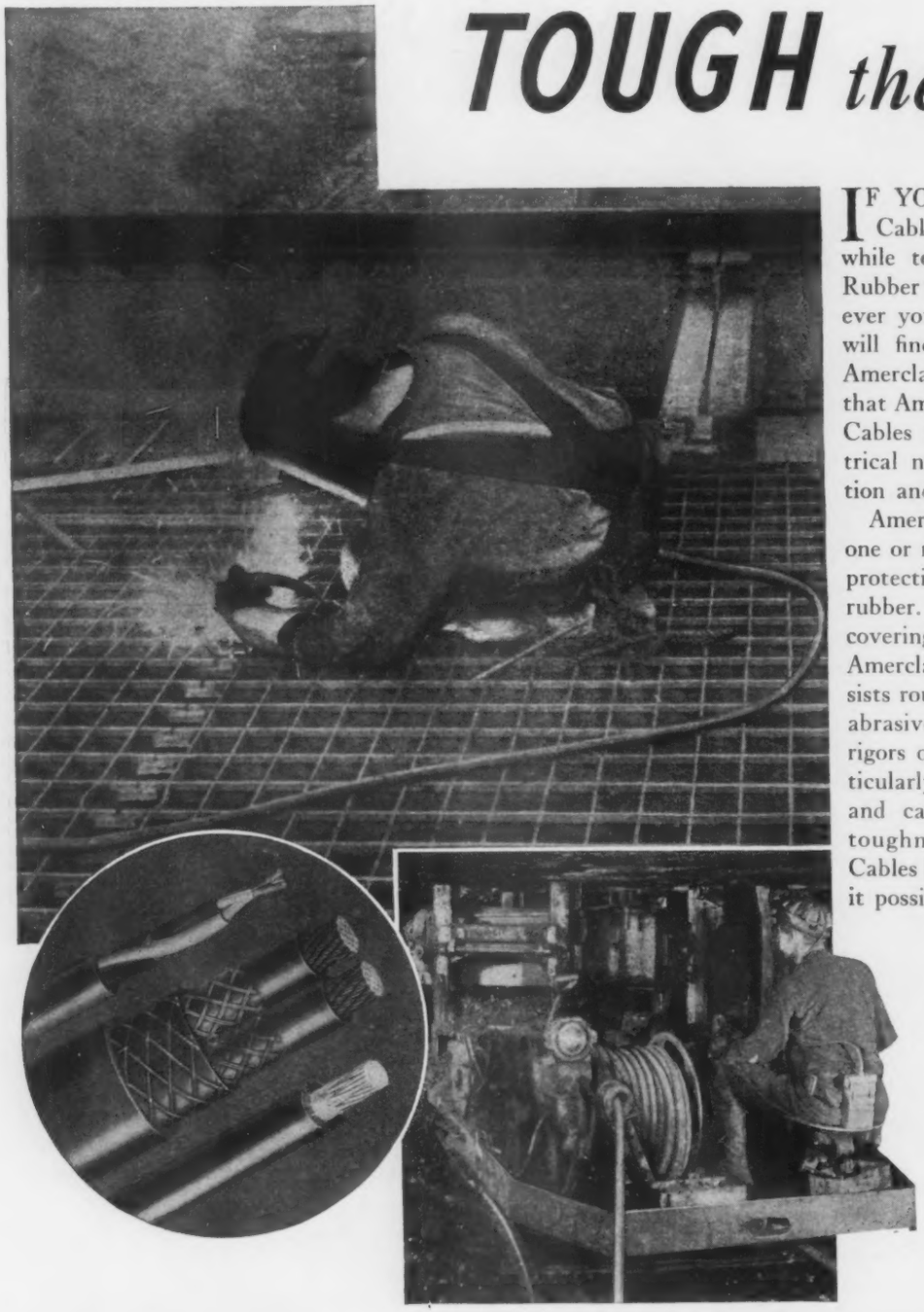
QUARE D COMPANY

S ANGELES - DETROIT - MILWAUKEE

URE D COMPANY CANADA LTD. TORONTO, ONTARIO

CALL IN A SQUARE D MAN

TOUGH *they have to be . . . and* TOUGH *they are!*



IF YOU use electrical Cords and Cables you will find it worth your while to investigate Amerclad All-Rubber Cords and Cables. For whatever your requirements may be you will find that they are within the Amerclad range. You will find, too, that Amerclad All-Rubber Cords and Cables will always meet your electrical needs with complete satisfaction and economy.

Amerclad construction consists of one or more conductors encased in a protective sheath of tough, resilient rubber. It is this tough protective covering that gives added life to Amerclad Cords and Cables. It resists rough treatment, oil, water, and abrasive wear . . . it withstands the rigors of heavy duty which are particularly destructive to portable cords and cables. Yet, with their extra toughness, Amerclad Cords and Cables have the flexibility that makes it possible to move them from place to place with ease.

Amerclad All-Rubber Cords and Cables are made by the American Steel & Wire Company, manufacturers of a complete line of Electrical Wires and Cables. When you order "Amerclad" you get the quality that is based on more than a century of wire-making experience. Send for our catalogue.

AMERCLAD *All-Rubber* CORDS AND CABLES

COLUMBIA STEEL COMPANY . *San Francisco*

Pacific Coast Distributors of Amerclad Cords and Cables for American Steel & Wire Company

United States Steel Products Company, New York
Export Distributors

UNITED STATES STEEL

"JUST A PIECE OF STEEL"

YET *It Eliminates* MECHANICAL ADJUSTMENTS

ALL METERS ARE NOT ALIKE

If motor accuracy is to be maintained, there must be an absolutely fixed relation between the various meter elements. In Westinghouse meters, no mechanical adjustment of these basic parts is necessary. Each unit is firmly and permanently mounted on one central grid—the sturdy meter frame. This construction assures the fixed alignment of parts so necessary to *sustained meter accuracy.*

IN ADDITION

these refinements contribute in assuring the sustained accuracy for which Westinghouse meters are noted:

A GOLD-PLATED METER REGISTER, preventing corrosion of the register gears no matter where the meter may be installed. This gold plating also reduces friction in the register.

ADVANCED PERMANENT MAGNET DESIGN—rigid unit construction contributes to fixed meter calibration. Its flux density is low. Full-load adjustment is an integral part of the magnet assembly.

A BALL AND DOUBLE JEWEL LOWER BEARING which lasts the life of the meter. Thirty-five years of operating experience have proved this to be so.

A ONE-PIECE ELECTROMAGNET CORE providing constant air-gap spacing and a permanently fixed mechanical alignment of the current and potential coil magnetic circuits.

Skill and painstaking craftsmanship have made Westinghouse meters unequalled for sustained accuracy. Careful design of every meter part guarantees that these meters will provide, with minimum attention and maintenance, the truest registration of consumed energy.

Ask our representative for detailed information.

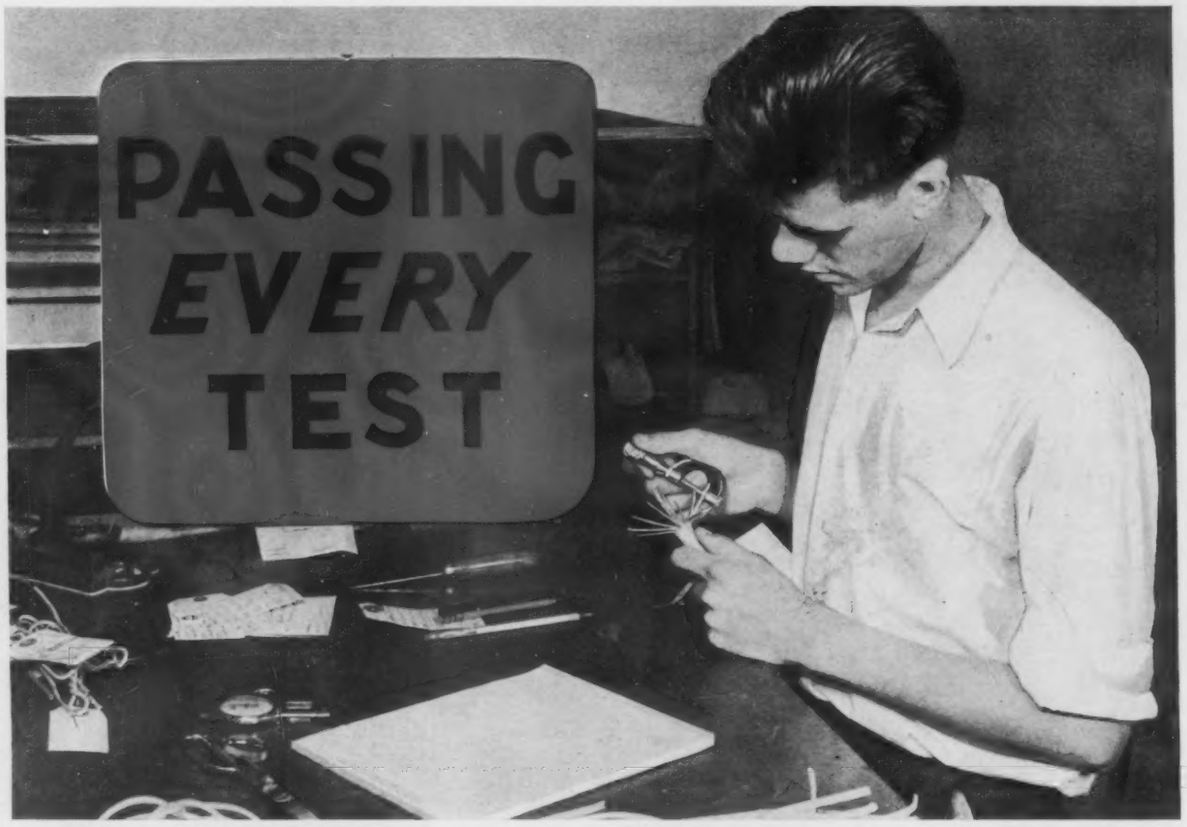
J 40087

Westinghouse

METERS
INSTRUMENTS
RELAYS

VARNISHED CAMBRIC • RUBBER POWER CABLES • BUILDING WIRE • RADIO WIRES • SIGNAL CABLE • FLEXIBLE CORDS • LEAD ENCASED AND PARKWAY CABLES • ARMORED CABLE

CRESFLEX NON-METALLIC SHEATHED CABLE • SERVICE ENTRANCE CABLE • MAGNET WIRE • BARE WIRE



CRESCENT

INSULATED WIRE AND CABLE

To meet the rigid requirements formulated by the government, engineering societies and various railways and utilities, CRESCENT maintains a close and constant check in every step of wire and cable manufacture.

Above, twirling fingers provide a check on accuracy of dimension, for which the uninitiated might call us fanatics. But, we *are* particular on this point in order to insure proper load capacity and easy fishing.

The Second of a Series of Sidelights in the Production of CRESCENT WIRE and CABLE

CRESCENT INSULATED WIRE & CABLE CO. INC
TRENTON, NEW JERSEY

WESTERN REPRESENTATIVES

LOS ANGELES
Henger-Seltzer Co.
130 S. Hewitt St.

SAN FRANCISCO
Hodges & Glomb
1264 Folsom St.

KANSAS CITY, MO.
W. F. Howe
526 Law Bldg.

CRESCENT ENDURITE SUPER-AGING INSULATION • WEATHER-PROOF WIRE

IMPREGNABLE!

In the Allis-Chalmers Seal-Clad Motor the wound stator receives impregnating treatment, similar to the conventional type of winding. Then a Moulded Shield of high dielectric and mechanical strength is fitted into a machined slot in the stator frame and tightly sealed into position with a special compound—thus giving complete protection to the coils.

This feature makes Allis-Chalmers Seal-Clad Motors impregnable to metallic dust, grit, oil, moisture, chemicals and other agents destructive to motor windings.

One or more of these destructive agents are present in every plant, to a greater or lesser degree . . . so why take a chance?

If your plant conditions are severe, the ultimate in motor protection is essential to you—Allis-Chalmers Seal-Clad Motors offer the ultimate in motor protection. If your plant conditions are not so severe as to make this protection absolutely essential, Allis-Chalmers Seal-Clad Motors are still the soundest investment you can make, BECAUSE YOU ARE GIVEN THIS GREAT ADDITIONAL PROTECTION AT NO ADDITIONAL COST.

For further details, write today for Leaflet No. 2182.

The Allis-Chalmers Mfg. Co. builds standard motors of every type from 1 hp. up—also motors for special application.

794

MOTOR DIVISION

ALLIS-CHALMERS

MILWAUKEE WISCONSIN

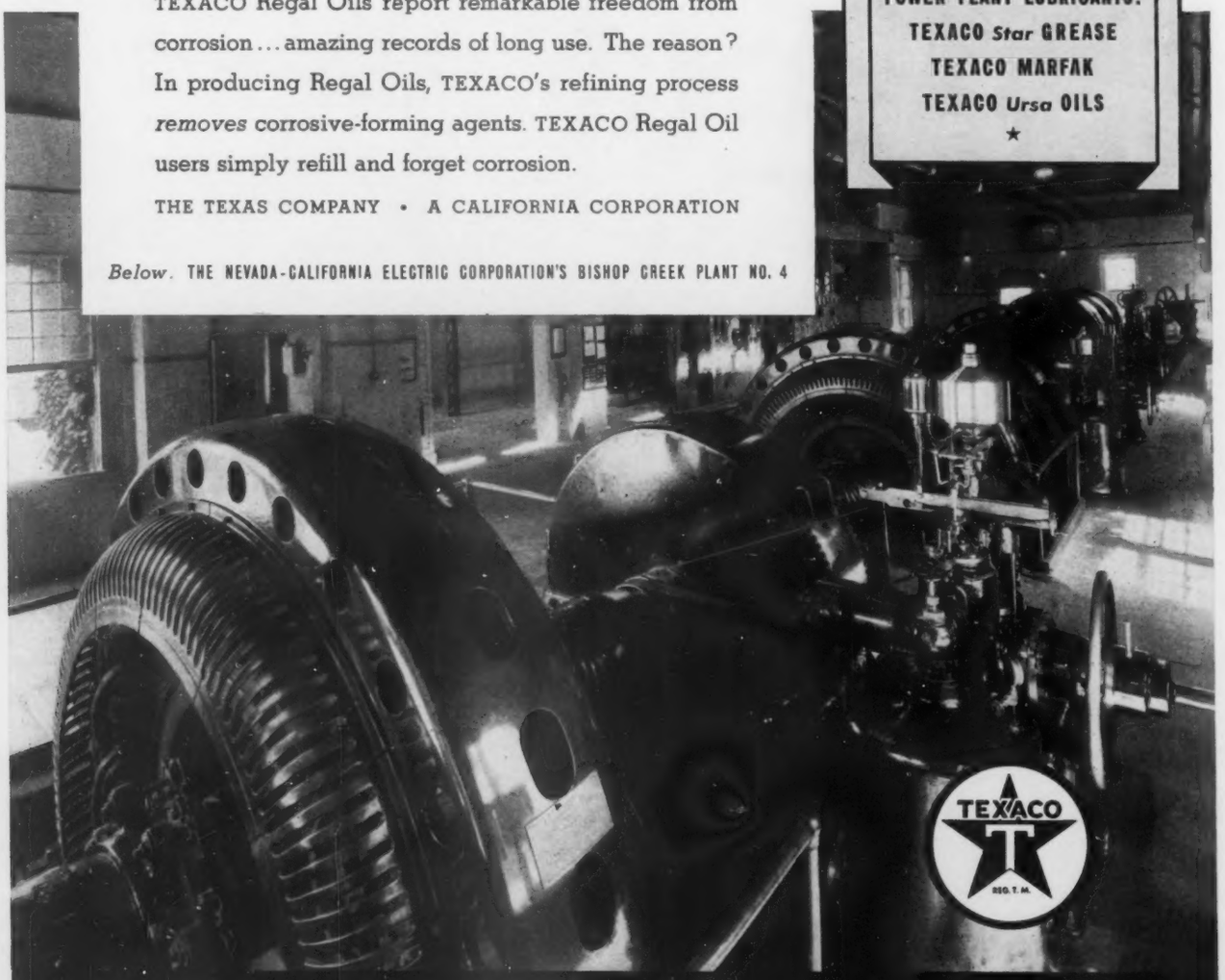
Positive GOVERNOR PROTECTION
AGAINST HYDRO PLANT ENEMY No. 1

CORROSION doesn't quit work during plant shut-downs ..Doesn't lay down on the job during heavy load hours. Corrosion works relentlessly on, day and night! ★ ★ Keep corrosion AWAY from precision governor bearing surfaces. Governor lubrication *can* be the least expensive of all hydro plant lubrication jobs. Users of TEXACO Regal Oils report remarkable freedom from corrosion... amazing records of long use. The reason? In producing Regal Oils, TEXACO's refining process *removes* corrosive-forming agents. TEXACO Regal Oil users simply refill and forget corrosion.

THE TEXAS COMPANY • A CALIFORNIA CORPORATION

Below. THE NEVADA-CALIFORNIA ELECTRIC CORPORATION'S BISHOP CREEK PLANT NO. 4

Other TEXACO
POWER PLANT LUBRICANTS:
TEXACO *Star* GREASE
TEXACO MARFAK
TEXACO *Ursa* OILS
★



TEXACO REGAL OILS

POLICY—

• • • *not just an idea!*

Accomplishments reflect policy.
From scratch to "The Jobs You Read About" in so short a time, has been termed a stroke of genius.
Genius?——Poof! Triangle products reward buyers . . . and the news spreads.
So, Triangle gets the business.
Resources are in product and production improvement, not dissipated in scouting for buyers.
If this policy didn't pay our customers and ourselves, we'd scrap it.
We just won't stick to a losing idea.

TRIANGLE CONDUIT & CABLE CO., INC.
Horace Harding & Queens Blvds. ELMHURST, NEW YORK CITY, N. Y.
PACIFIC COAST DIVISION
C. C. Hillis, Vice-President in Charge of Sales, 390 Seventh St., San Francisco, California

ARTERIES FOR ELECTRICAL SYSTEMS

It **MUST** *be right!*

ALL RIGHT—WHO *GETS* T

DON'T LET THIS HAPPEN TO YOU!
ONE CENT NEVER BOUGHT SO MUCH COLD AND ICE!
Kelvinator has an all-time sensation in the new "POLAR POWER" Unit, with its tremendous cold-making power and economy . . . an all-time VALUE in its brilliantly planned new convenience!
4-COLOR PAGES
Brilliant, smashing ads . . . running continuously in SATURDAY EVENING POST . . . COLLIER'S . . . THIS WEEK . . . AMERICAN WEEKLY . . . and other powerful magazines!
Kelvinator
THE CHAMPION ICE-MAKER
HERE'S WHERE YOU CAN SEE THIS MIRACLE OF COLD-MAKING TOMORROW
PROVES
E-MAKER!
Kelvinator
THE CHAMPION ICE-MAKER
HERE'S WHERE YOU CAN SEE THIS MIRACLE OF COLD-MAKING TOMORROW
VINATOR'S
LD-MAKING!
Kelvinator
THE CHAMPION ICE-MAKER
HERE'S WHERE YOU CAN SEE THIS MIRACLE OF COLD-MAKING TOMORROW

BREAKING THE GREATEST STORY IN REFRIGERATOR HISTORY!

You have never seen refrigerator ads like the tornado Kelvinator is turning loose for 1938. There's plenty in them to get excited about.

They're in full color . . . they're full pages . . . they run continuously (and we mean continuously) in the most popular, most influential magazines in the country.

They've got new "interest getting" power that starts with the first word and never lets up. They've got a new way of glorifying a beautiful refrigerator in pictures . . . and telling a whole sales-story in pictures . . . that will be one of the big wallops of the year.

Then there's a smashing, fighting campaign of power-house space in Key Cities . . . listing dealers.

BUT THAT'S ONLY A SMALL PART OF IT!

There's a complete, balanced, carefully-planned, "tailored to order" program for *each individual dealer's local use.*

And every detail, every word and line of it is sharp-pointed fighting, SELLING HELP—right on the target of making sales *NOW!*

It's so big and so good that you'll *kick* yourself all year if you don't find out about it . . . and get in on it . . . *right now!*

Gangway for the 1938 **KELVINATOR**

THE $5,000 FIRST PRIZE

AND THE 7 OTHER PRIZES IN THIS $8,000 KELVINATOR CONTEST THAT'S OPEN TO THE WHOLE ELECTRIC APPLIANCE INDUSTRY?

FULL DETAILS HERE!

Everyone in the industry can get in on it—presidents or office boys—ANYONE who is not on the Kelvinator office or factory payroll. IT'S WIDE OPEN!

There's something mighty big happening at Kelvinator . . . *again* this year! So big we want every person in the industry to know and understand it from A to Z. That's the purpose of this $8,000 contest—with its $5,000 first prize.

Now for the facts you need to get in on it . . . simple . . . straight-forward . . . no red tape nor strings.

First—See the 1938 Kelvinator line, and learn about the 1938 Program, through your nearest Kelvinator distributor.

Second—Decide which of *the following three factors will* be most helpful to Kelvinator Dealers in 1938 . . . and tell, in a letter of 50 words or less, why you think so.

❶ *THE PRODUCT*—12 beautiful new 1938 models . . . sealed, silent Polar Power unit so amazingly efficient and economical it delivers 72 big ice cubes for 1c (figured at the national average rate for electric current) . . . sensational new Speedy-Cube ice release . . . remarkable, exclusive new shelf adjustability . . . and a score more great selling features.

❷ *1938 ADVERTISING PROGRAM*—tremendous, continuous full-page, four color campaign in foremost magazines . . . tremendous "key city" campaign, *listing dealers* . . . and individually tailored local program for *every* Kelvinator dealer.

❸ *1938 SALES-CLOSING PROGRAM*—tested and proved sales-training materials . . . door openers . . . carefully planned seasonal selling-campaigns . . . generous customer financing-plans . . . and plenty more!

$5,000 FOR 50 FRANK WORDS!

See the products and get the facts from your Kelvinator distributor.

Use your own good judgment as to which of the above factors in the whole mighty program will add most to its success.

Then tell us, in a letter of 50 frank words or less, why you figure it that way. Doesn't matter a bit which factor you think counts most—or whether or not that factor actually does turn out to be most important.

We're after frank opinions . . . good business thinking by the people in our own industry. And an office boy's letter will be read and considered on absolutely even footing with the letter from a president of a company.

THE PRIZES will be: $5,000 first prize; $1,500 second; $500 third; and five prizes, fourth to eighth inclusive, of $200 each. Substantial enough to be worth trying for, in any man's time.

THE RULES are just three: anyone in the electrical appliance industry can compete except people on the Kelvinator office or factory payrolls; letters must be limited to 50 words; and all letters must be postmarked before midnight, January 30, 1938, addressed to *DEPT. K, Kelvinator, Division of Nash-Kelvinator Corporation, Plymouth Road, Detroit, Mich.*

There you are. Come one, come all!

SEE THE NEW KELVINATORS AND GET FULL 1938 PROGRAM STORY FROM YOUR NEAREST KELVINATOR DISTRIBUTOR!

LIST OF KELVINATOR DISTRIBUTORS

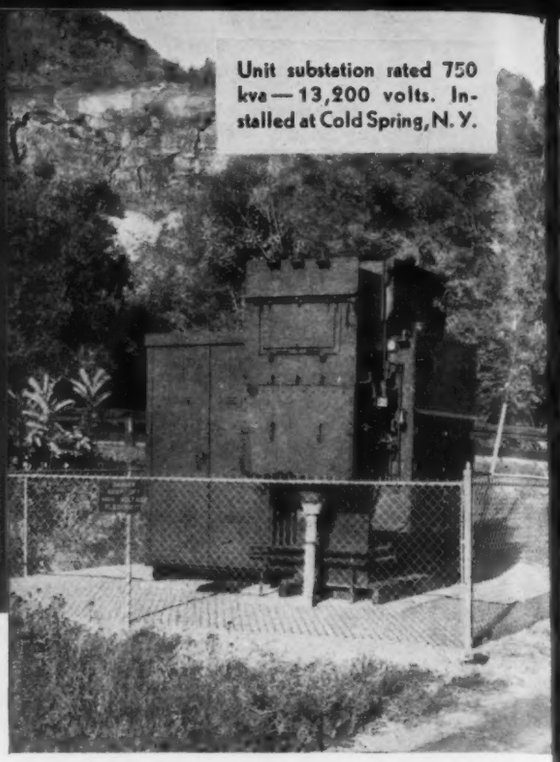
Albany, N. Y.	Albany Garage Co., 28 Howard St.
Albuquerque, N. M.	Raabe-Mauger Co., 112 W. Copper St.
Amarillo, Tex.	Amarillo Hdwe. Co., 506 Tyler St.
Atlanta, Ga.	Graybar Elec. Co., Inc., 167 Walton St., N.W.
Baltimore, Md.	Nash-Kelvinator Corp., 1426 N. Charles St.
Bay City, Mich.	George F. Dent Co., 210 Fifth Ave.
Birmingham, Ala.	R. P. McDavid & Co., 2104 First Ave., No.
Boise, Idaho	Walker Electric Co., 10th & Grove Sts.
Brooklyn, N. Y.	E. A. Wildermuth, 1102 Atlantic Ave.
Buffalo, N. Y.	Appliance Wholesalers, Inc., 320 Franklin St.
Burlington, Vt.	G. S. Blodgett Co., Inc., 190-200 Bank St.
Cambridge, Mass.	The Eastern Co., 620 Memorial Drive
Casper, Wyo.	Casper Supply Co., 444 S. Center St.
Chicago, Ill.	Nash-Kelvinator Corp., 2451 So. Mich. Ave.
Cincinnati, Ohio	Graybar Elec. Co., Inc., 310 Elm St.
Clarksburg, W. Va.	Williams Distributing Co., 406 N. Sixth St.
Cleveland, Ohio	Graybar Electric Co., 1010 Rockwell Ave.
Columbus, Ohio	Pixley Electric Supply Co., 129 Chestnut St.
Dallas, Texas	Graybar Electric Co., Inc., 400 S. Austin St.
Davenport, Iowa	The Elec. Equipment Corp., 116-118 E. First St.
Des Moines, Iowa	Sidles Co., 118 Tenth St.
Detroit, Mich.	Nash-Kelvinator Corp., 4809 Woodward
Erie, Pa.	Winter Co. of Erie, 1015 State St.
Fresno, Calif.	Devlin Drew Co., 718 F Street
Gastonia, N. C.	Moore & Stewart, Inc., 105 E. Franklin St.
Green Bay, Wisc.	Morley-Murphy Co., 112-14 Washington St.
Greenville, N. C.	Carolina Sales Corp., Third & Cotanche Sts.
Hagerstown, Md.	Bohman-Warne, Inc., 16 Summit Ave.
Helena, Mont.	Modern Utilities Co., Fuller & Lawrence Sts.
Henderson, Ky.	Lambert-Grisham Co., Inc.
Houston, Texas	Straus Bodenheimer Co., 1510 Preston Ave.
Huntington, W. Va.	Emmons Hawkins Hdwe. Co., 1028 Third Ave.
Indianapolis, Ind.	Kiefer-Stewart Co., 141 W. Georgia St.
Jacksonville, Fla.	Graybar Electric Co., Inc., 2302 Main St.
Kalamazoo, Mich.	North Davis, Inc., 439 Portage St.
Kansas City, Mo.	Richards & Conover Hdwe., 5th & Wyandotte Sts.
Knoxville, Tenn.	East Tennessee Elec. Co., 612 E. Depot St.
Lancaster, Pa.	Landis Electric Shop, 121 N. Duke St.
Lansing, Mich.	Garlock Sales Co., 105 W. Washtenaw Ave.
Lincoln, Neb.	Sidles Co., 1228 P Street
Little Rock, Ark.	555 Incorporated, Broadway & Second
Long Island City, N. Y.	Nash-Kelvinator Corp., 27th St. & Pearson Pl.
Louisville, Ky.	Graybar Electric Co., Inc., 626 6th St.
Memphis, Tenn.	Arthur Fulmer, 260-270 Monroe Ave.
Miami, Fla.	Graybar Elec. Co., Inc., 68 N. E. 20th St.
Milwaukee, Wisc.	Morley-Murphy Co., 424 N. Plankinton Ave.
Minneapolis, Minn.	Graybar Electric Co., Inc., 413 S. Fourth St.
Newark, N. J.	Krich-Radisco, Inc., 422-43 Elizabeth Ave.
New Britain, Conn.	Rackliffe Bros. Co., Inc., Park & Bigelow Sts.
New Orleans, La.	C. T. Patterson Co., Inc., 800 S. Peters St.
Norfolk, Va.	Tidewater Electric Co., 127-135 E. Olney Rd.
Omaha, Neb.	Sidles Co., 502 S. 19th St.
Pensacola, Fla.	Pensacola Hardware Co.
Peoria, Ill.	Marquette Appliance Co., 800 S. Wash. St.
Philadelphia, Pa.	Raymond Rosen & Co., N.W. Cor. 31st & Walnut
Phoenix, Ariz.	Electrical Equipment Co., 424 N. Central Ave.
Pittsburgh, Pa.	C. R. Rogers Co., 5434 Penn Ave.
Portland, Ore.	Appliance Wholesalers of Ore., 123 N. E. 3rd Ave.
Poughkeepsie, N. Y.	Poucher, Wood & Wallin, Inc., 407-9 Main St.
Providence, R. I.	Post & Lester Co. of R. I., Inc., 89 Broadway
Richmond, Va.	Gathright's, Inc., 416 E. Grace St.
Roanoke, Va.	Thurman & Boone, Inc.
Roswell, N. M.	Mabie Lowrey Hdwe. Co., 115 N. Main St.
Salt Lake City, Utah	Flint Distributing Co., Box 1470
San Antonio, Texas	Southern Equip. Co., Cor. Villita & Navarro
San Diego, Calif.	San Diego Standard Elec. Corp., 1407 Columbia
San Francisco, Calif.	H. R. Basford Co., 425 Second St.
Savannah, Ga.	M. Wilensky & Son, Inc., 223 E. Broughton St.
Seattle, Wash.	Graybar Electric Co., Inc., King & Occidental Sts.
Sioux City, Ia.	M. H. Kirchbaum, 417 W. 3rd St.
Sioux Falls, S. D.	Tri-State Electric Co., 407 E. Eighth St.
South Bend, Ind.	Radio Equipment Co., 213 W. Jefferson Ave.
Spokane, Wash.	Tull & Gibbs, Inc., First & Wall Sts.
Springfield, Mo.	Ozark Motor & Supply Co., 308-19 S. Jefferson
St. Louis, Mo.	Graybar Electric, Inc., 1220 Spruce St.
Syracuse, N. Y.	Graybar Elec. Co., Inc., 327 North West St.
Tampa, Fla.	Graybar Electric Co., Inc., 416 Ella Mae St.
Toledo, Ohio	V. J. McGranahan Dist. Co., 1702-04 Madison St.
Welch, W. Va.	Jones Cornett Elec. Co.
Wheeling, W. Va.	Earle Rogers Co., Main & 12th Sts.
Williamsport, Pa.	Williamsport Auto Parts Co., 241 W. Third St.
York, Pa.	The Careva Co., Inc., 145-47 W. Market St.
Youngstown, Ohio,	Stambaugh-Thompson Co., 114-118 W. Fed. St.

The Champion Ice-Maker!

SAVE

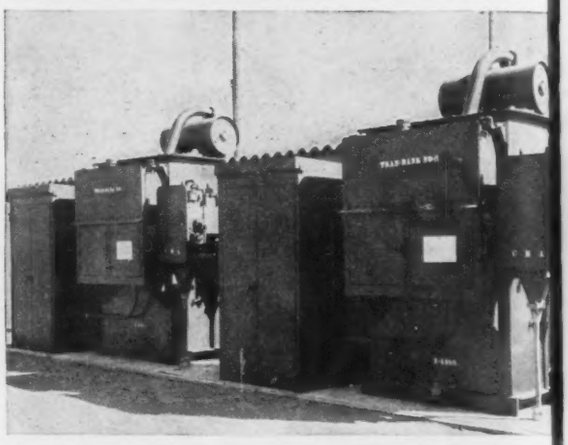
WITH UNIT SUBSTATIONS

SAVE system investment—real estate—taxes—layout time—and reduce construction and installation time. Here are a few G-E unit substation installations where these savings have been obtained. Your system, too, may present similar opportunities. General Electric Company, Schenectady, N. Y.



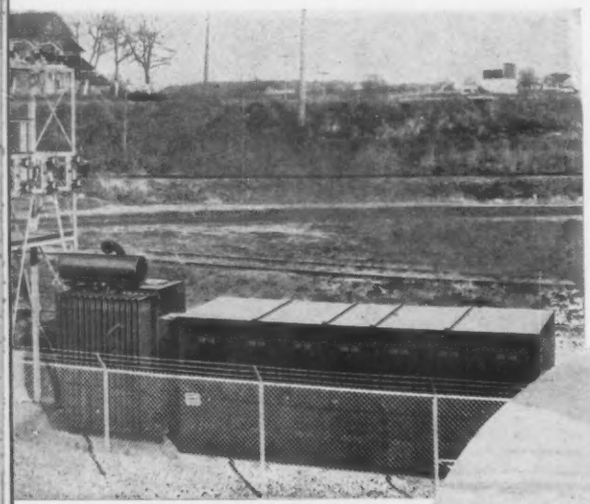
Unit substation rated 750 kva—13,200 volts. Installed at Cold Spring, N. Y.

Below Right—
Two unit substations, each rated 750 kva—23,900 volts. Installed at El Paso, Texas.

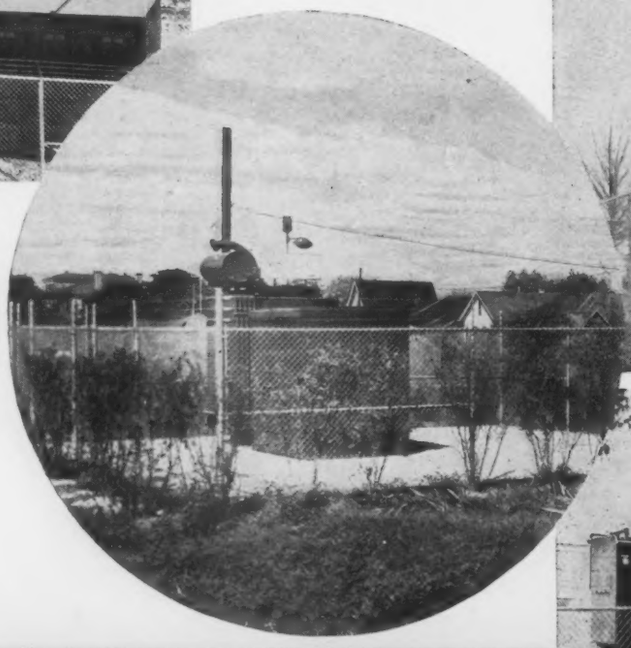


Center Right—
Unit substation rated 1500/2000 kva—33,000 volts. Installed at Indianapolis, Ind.

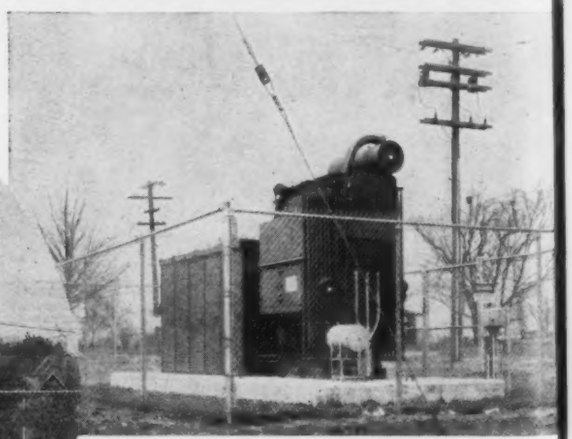
Lower Right—
Unit substation rated 1500 kva—11,000 volts. Installed at Rochester, N. Y.

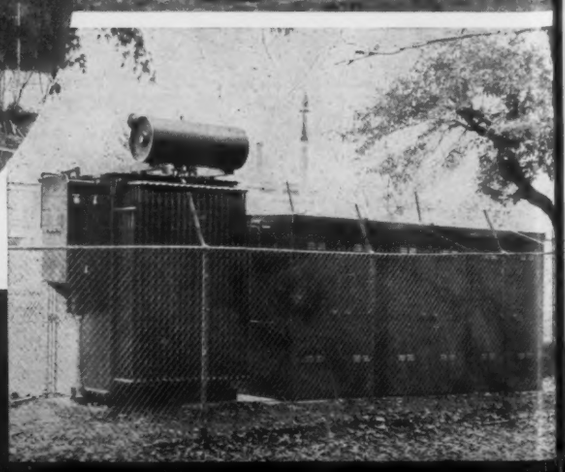


Unit substation rated 1500 kva—13,800 volts. Installed at Aurora, Ill.



Unit substation rated 1500 kva—13,800 volts. Installed at Louisville, Kentucky.





GENERAL ELECTRIC

310-25

ELECTRICAL WEST

December, 1937
Vol. 79, No. 6

ELECTRA'S HUSBAND

Olive Branches and Common Law

"WHAT's this I hear about the administration wanting you light and power people to submit to the 'common law'?" Electra asked after listening to her favorite commentator the other evening.

"If I tried to tell you, you wouldn't understand. It's more complicated than your efforts to balance your checkbook at the end of the month. So put it down simply as a compromise offering of the olive branch."

"Oh, so it's compromising. Will it be like that newspaper case where the husband caught his wife with his best friend and shot them both? Won't that be thrilling!"

"You're just a trifle mixed in your legal terms. You're thinking about the 'unwritten law,' although at that, you may be right. Now please let me hear Amos and Andy."

"WHATEVER be the purpose, implicit or explicit, Washington's sudden interest in 'common law' utility valuation methods, must be considered in the light of present conditions to evaluate its true significance. The administration is convinced that it must attain a balanced budget, yet current business reflects a recession that will, unless quickly corrected, increase the demands for government spending and at the same time reduce federal revenue. "Pump-priming" expenditures cannot be resumed without a radical change in policy. The alternative is the stimulation of private capital investments so as to take up the slack in employment and rebuild business volume.

It is becoming increasingly apparent that the utility field presents a tangible opportunity for a sizeable construction program—one which would especially stimulate the durable goods industries. The utilities themselves estimate that there is a vast reservoir of untapped jobs outrivalling the programs of PWA and WPA. The 10-year average of new construction from 1923 to 1932 was $752,000,000 annually. The annual average for the last five years has been $239,000,000 . The result is an electric utility construction reservoir conservatively estimated at $2,600,000,000—with an immediate normal program which might, in 1938, exceed one billion dollars. Here then, is a privately-financed recovery program which will cost the taxpayers nothing and add much to the taxable wealth of the nation.

A seemingly fixed punitive policy toward the utility industry as reflected in a series of administration measures designed to throttle and intimidate it has so frightened private capital that financing this needed construction has been impossible.

Thus the motive for the extension of the olive branch assumes significance. Briefly stated, it is this: "You submit to the 'prudent investment' theory of valuation and we will forego our policy of subsidized competition and strangulating regulation."

If more concessions are forthcoming from the administration, if a spirit of real compromise will bring peace, then the whole electrical industry will benefit. When I explained all this to Electra, she had an apt comment:

"Why, that's not common law; it's common sense."

ELECTRA says she heard the following story on the radio. It couldn't happen in this enlightened age of customer service unless it was on a utility system operated by Stoopnagle and Budd. But here it is:

A lady who was living very simply and quietly in a small downtown apartment suddenly had her gas and electric light turned off one afternoon a while ago. She called up the company as soon as she discovered it.

"My gas and light are shut off," she said. "Will you please have someone come and fix them?"

"One moment please," said the gas and light company, and then, after some time they came back to the phone. "You aren't living in that apartment any more," they told the lady.

The lady counted ten. "Oh, yes I am," she said.

"Sorry," said the company, hanging up.

The lady thought the thing over until the next day. Then she called up again. They told her she wasn't living there that day either. She thought some more. Then she remembered that the man who lived downstairs, a Mr., shall we say, Jones, had recently moved away. Ah, apparently his gas and light were still on.

She called the gas and light company again and told them about the new development in the situation.

"One moment please," said the gas and light company, and then, after some time they came back to the phone. "You're living with Mr. Jones, aren't you?" they said.

Nothing ruffled this lady any more. "No," she said, "I am not."

"Oh, yes you are," said the company.

"I want it made clear once and for all," said the lady, "that I am living quite alone. I am *not* living with any Mr. Jones."

"Well," said the gas and light company, with a deep sigh, "you're living with Mr. Jones in our files."

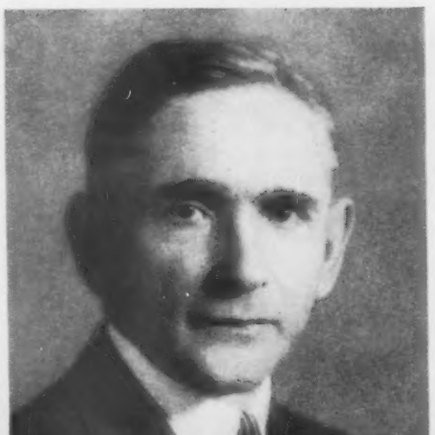
(The man in the advertising department down the hall just read this and said the radio comedian who sprung the story was a plagiarist. He saw the story in *Tide*.)

APOLOGIES are due the fair city of Palo Alto, unwittingly maligned in our October column. Its municipal utility does pay taxes to the city; and its rates are lower than those of the adjacent private company. The city is unique—a university community which prides itself on the integrity of its municipal government.

SO WHAT?

What if the Electrical Industry is under fire? What if it has achieved much? Forget the past and go to work on the future

By DR. ADAM S. BENNION
Assistant to the President
Utah Power & Light Co.



ONE current phrase carries a unique challenge. It is a condensed query with the force of some such expression as "After all's said and done, what shall we do about it?" In the light of what has happened to and in our industry in the last eight years, it is significant that we all take a double look—back across those years and out into a rather uncertain future—and ask, *"So What?"*

Business has just gone through one of America's greatest economic crises. Our own industry has been tested as have but few others—ever. Not only did we lose load and suffer tremendous losses of revenue, but we came under a political indictment which incited poisonous public propaganda which was not tempered by judicious review, even in the White House. Nor was that all. In spite of an accepted theory of public regulation which supposedly gave to authorized utilities pre-empted fields in which to operate, free from competition—a condition under which in good faith $13,000,000,000 has been permanently invested—local municipalities, aye, the National Government itself, entered into competition with their own citizens, thereby threatening to destroy one of America's leading industries.

No Whining; No Buck-Passing

Let's not whine. And let's not pass the buck. Something must have been wrong with some of the utilities or the American people would have long ago discarded the propaganda as trumped up and unfair. Some where along the line, our history must have smacked of too much "write-up," or "watered stock," or "pyramiding," or our practices must have echoed too much arbitrariness or our personnel must have assumed what came to be interpreted as a "Holier-than-thou" attitude. Either that or we were so busy building plants and extending lines that we neglected to see that the people understood our procedure as we perfected an agency which has come to mean so much in their lives.

But those things can be remedied. No institution should be destroyed merely because mistakes have crept into its evolution. Were such a policy to be followed even Congress would have difficulty in avoiding extermination. Read the history of medicine or of education—aye, even of religion and see what changes have had to be made in the course of their evolution. Yet we do not threaten to destroy them because what they once did can no longer be defended. Progress always involves writing mistakes out of experience.

Great Achievements

The achievements of electrical organizations in this country are among the finest ever written into industrial history. Space forbids an enumeration of those accomplishments here but any agency which has brought the benefactions of electric service to 22,000,000 homes and farms, which has lifted the load from the back of him who labors in practically every mill, factory and mine in our country—a total of more than 26,000,000 customers—which has pioneered plants and lines against the worst hazards of the frontier, which has maintained service through all hours of the day and night against the odds of storm and disaster, which has played its part in the building up of every community in the United States of 1,000 population, which has sponsored and developed new uses until now American homes enjoy more than 100,000,000 electrical appliances in use every day—

Any agency which has done all this and in doing so has reduced costs until for the average home they are 4½c per kw.-hr. instead of the old 15-20c—

An agency which supplies the average American home its electrical service at an annual cost of $33—nine cents a day—

An agency which now generates at the rate of 110,000,000,000 kw.-hr. a year at an over-all rate of 1.94c—

An agency which has invested $13,000,000,000 to do an annual gross business of $2,000,000,000—

Electricity at Nine Cents

An agency which meets the electric requirements of all the homes served in America for $700,000,000 a mere pittance in a land with a $9,000,000,000 annual budget—

Such an agency deserves not only to live—it deserves the gratitude of the American people.

A year ago at a national convention in St. Louis, I urged the importance of telling our story to the people. Before that time and since, I have been trying to find out what is in the public mind. I am convinced of three things.

1. *The American people want to be fair.* They can be depended upon to be so when they know all the facts.
2. *They hate to be "held up".* And if they are led to think they are being held up, that thought is quite as potent as the reality itself could be.
3. *They are not eager to turn American business over to Washington for governmental operation.*

No one can review the developments of the last half dozen years and not know that our industry has been genuinely threatened. It is being tested to the very foundations. The attack has been both subtle and insidious. Under such an attack the response of our own

employees has been varied. At least five different reactions are evident.

In the first place there are The Alarmists.

To these people the end is in sight—not only from industry—I suspect they hear Gabriel tuning up for the final great blast. To such folk the Red Revolution is already on. We are headed for dictatorship and complete socialization—the only question being "will it be Fascism, Nazism, Socialism, or Communism?"

Of course, the Alarmist is a critic. He hurls charges right and left. But one purpose of an industry like ours is to rise above criticism. Doesn't it seem strange to hear politicians brand industrialists as crooks and "economic royalists" only to have the business man answer the charge by labeling the politician as incompetent and corrupt? No doubt there are exceptional cases in both fields in which there may be foundation for the charges, but by and large, the men of Congress are men of integrity—so are the men of our industry. Time will find out both classes.

In the second place there are The Defeatists.

For these men the industry is ruined—it has no future. To them, governmental ownership is inevitable. They find some little solace in the thought that the government will take over the young employees and those in the lower brackets of wages. For the rest—curtains. They remind me of the man "who didn't think he could make it."

Certainly the defeatist offers no solution for those of us who still hope to stay in the business.

The Indifferentists

The third group are The Indifferentists.

They are the "We should worry" type. They remind me of the "Horse that wasn't blind—he just didn't give a damn."

They argue that if we don't survive, the government will take care of us. They never work out a solution.

And then there are The Analysts.

Fortunately we have them in our industry. They have a scent for *facts*. They really seek out an intelligent answer. They know and can prove that:

The service of private plants is better than that of municipal plants.

The rates of private plants, taxes allowered for, are substantially lower.

T. V. A. as a yardstick is a myth—and is a dishonest measure. Flood control, reforestation, navigability, and social regeneration make the notches on the stick meaningless.

"Taxless towns" and "great municipal profits" with but few exceptions, are borne of poor bookkeeping.

Five and one-half million stockholders are having their savings jeopardized as are three million bondholders.

Two billion dollars of insurance investments are endangered.

So also are endowment funds of 550 colleges and universities.

Electric service is "the greatest bargain in the American home." "It does so much—it costs so little."

To destroy a $13,000,000,000 industry and then to tax the people to rebuild it is both unfair and unsound.

Sooner or later that kind of economics must disturb the layest of laymen.

The Realists Say "So What?"

And finally, there are what I like to call The Realists.

It is they who really give me my subject—"So What?"

They know that we are still in business—they have a conviction that we are to remain in business—but they ask "What can be done about it? What can we best do to restore public confidence?"

Many things can be done, are being done. Let's center our attention upon what the employees within our organization can do. We shall have to leave for other discussions such matters as: How can our interests best be safeguarded in local, state and national legislative bodies; effective newspaper advertising, commercial and institutional; how to make the best use of the radio; the value of billboards; theatre films and their use; addresses before clubs and other educational institutions; demonstration homes; institutional trips and displays; traveling kitchens and fix-it trucks.

We have in the industry 266,500 employees. Each one of them has his friends and associates. Each one of them makes neighborhood, club, church and other connections. *Interested, informed, enthusiastic*, they can be a tremendous power. After all, "Men, Money, and Materials are the sinews of business—but the most important of these is *men*." From here on out, I am convinced our problem is chiefly a human problem. We must do more work with people if they are fully to understand our business. And the place to begin is *at home*—with our own institutional family.

Corporation Employees

And how they can promote good-will

In this day when large corporations are being constantly subjected to public criticism, those men and women who are closest to the public—the corporations' employees—are the key to the problem of changing this criticism into good-will. Recognizing this generally accepted fact, Nevada-California Electric Corp. recently held a two-day employee meeting in LaRamada, Calif., to discuss plans whereby the employees might be of most value to the publicity department in promoting friendly relations between company and public.

That the meeting was a success is shown by the number and variety of ideas advanced by the workers. Although many of these were strictly peculiar to Nevada-California, they are all worthy of note. Suggestions made were:

That the company place itself at the disposal of the community in helping to advertise and promote charitable campaigns.

That the company serve as a clearing house for social and other events of general community interest. This could be accomplished either by publishing a calendar of these events or, better, by broadcasting the announcements over the company's regular radio program.

That the employees be permitted to furnish the newspapers with items having to do with the activities of the personnel. Stories dealing with the company would, however, continue to be handled by the publicity department.

That the company provide in its various offices rooms which might be used for civic committee meetings and other conferences.

That the company assist in publicizing high school events.

That the Valley Homebuilder, company paper, feature appropriate local subjects such as pictures of schools, service club affairs, etc.

That after storms causing interruptions of service the company give out accurate details showing the interruptions were not due to faulty lines.

Lighting Plans for The World's Fair

By CHARLES L. HUYCK
Graybar Electric Co., San Francisco

Court of the Seven Seas

WHEN a home is built, we expect the electricians to move forward in synchronism with the other craftsmen. Before a new plant can produce, the electrical engineers and journeymen must have a complete layout of its various processes. But when a gigantic World's Fair is planned, practically every major and many minor details of finance, architecture and decoration must have been perfected long before the entrance of its star, electricity.

So it is with the Golden Gate International Exposition, now only fourteen months distant from the opening day, Feb. 18, 1939. Its permanent construction is nearly completed, its temporary construction is ahead of schedule, its $7,500,000 subscription list is over two-thirds bespoken, its exhibitors already include twenty foreign nations and twenty-five States, even its muralists and sculptors already know their themes —and yet we are just now able to sketch its electrical details.

Two Lighting Divisions

The electrical illumination of the exposition falls naturally into two divisions, the line of cleavage being between the exterior work, which is mainly decorative and spectacular, and the interior installation, which is mainly utilitarian and efficient.

The exterior illumination is being handled by the General Electric Co. on contract, with factory experts A. F. Dickerson, J. W. Gosling and H. E. Mahan especially assigned to its complex problems. Allen Jones of the San Francisco office is in local charge, with A. V. Thompson as his field representative.

Rodney Doerr, lighting sales manager for the Pacific Gas and Electric Co., is chairman of the advisory committee on interior lighting, heading a group of over twenty Bay region specialists from various manufacturers and wholesalers. These all clear through William R. Van Bokkelen, chief of the division of electricity for the G.G.I.E., with George Garthorne as his assistant. Their superior officer is Vice-President and Director of Works W. P. Day.

Arthur Halloran, long known as a pioneer on the fringes of such future practical achievements as television, is chief of the Palace of Electricty and Communication, and has already sold or holds options for the greater part of its floor space. Another well-known electrical man who is serving as chairman of exhibits, is A. Emory Wishon, president of the San Joaquin Light & Power Co. And back of all, among the Olympian figures on the Board of Management, is James B. Black, president of the Pacific Gas and Electric Co.

General Electrical Details

Here are some overall electrical details: Three 9,000-ft. submarine cables will carry power from the East Bay pierhead to a 16,000-kva. substation on the island. Approximately 10 mi. of 4-kv. three-phase underground feeders, 25 mi. of street-lighting cable and a vast ramification of secondary will be required for distribution. All the major exhibit palaces, whether permanent or temporary, will be wired in conduit; as much as possible of the decorative lighting will be knob and tube work.

J. E. Stanton, colorist (left), and E. L. Frick, chief of the division of architecture, discuss general lighting of Treasure Island

Intensive effort on the electrical installation, costing over $1,000,000, will begin about March, 1938. It is estimated that the exposition will consume over 40,000,000 kw.-hr. during its 288 days of operation. Power and light will be re-sold to exhibitors and will thus provide an additional source of revenue.

From its conception, the exposition has been envisioned as "a city of light floating in space." Necessity and beauty will march hand-in-hand.

Approaching the fair by ferry, one will first be impressed by its 80-ft. walls floodlighted in white by projectors concealed in troughs. This high intensity effect will be broken only by contrasting lower intensities in the two setbacks, by wide green circles above the minor entrances, by floodlighted palms and cylindrical amber lanterns spaced 60 ft. apart and by the two major entrances.

One of these portals will be flanked by pyramids surmounted by colossal elephants. The steps will be floodlighted in increasing intensity, with spectacular effects from doorways bathed in Aztec red.

Court of the Pacific

Passing through the portals of the other gateway, which is not so elaborate as its fellow but is expected to be more useful because of its proximity to the ferry slips, one then enters the Court of the Pacific. Major lighting elements here are floodlighted golden walls and sixteen towering 75-ft. cylindrical lanterns arranged in pairs. Other decorative features are floodlighted stands of flags of the nations bordering upon the Pacific, fountains played upon by a continuous spectrum of colors, the lofty spotlighted statue of "Discovery" and two brilliant mural panels.

To the right of this court is the north-south axis leading toward the Central Tower. Proceeding along it, one first traverses the 1000-ft. Avenue of the Seven Seas, which might also be christened the Esplanade of the Three Fruits, for apricot and peach will be the colors

of the walls and lemon their setbacks—all the result of floodlights and fluorescent tubes. The walls will be broken by sixteen 60-ft. entrance pylons, each surmounted by a trireme beak and a heroic figure. The intervening wall spaces are to be decorated by submarine subjects: a twin row of lighting standards, representing masts and crows-nests, extending down the center. All these details will be floodlighted or highlighted by fluorescent paints subjected to ultra-violet light from concealed projectors.

Most conspicuous structure of the fair, however, will be the 400-ft. Spire to the Sun located in the Central Court. Warm amber with blue setbacks is the keynote of this area and its surrounding pavilions. A ground battery of floods will bathe the base in amber; a roof battery will blend it with white, and the effect will be a gradual increase of white intensity as the tower soars upward. Surmounting figure is a phoenix arising from a red pyre. The interior of the tower will shade from its basic amber through orange to rose-red where it merges with the pyre.

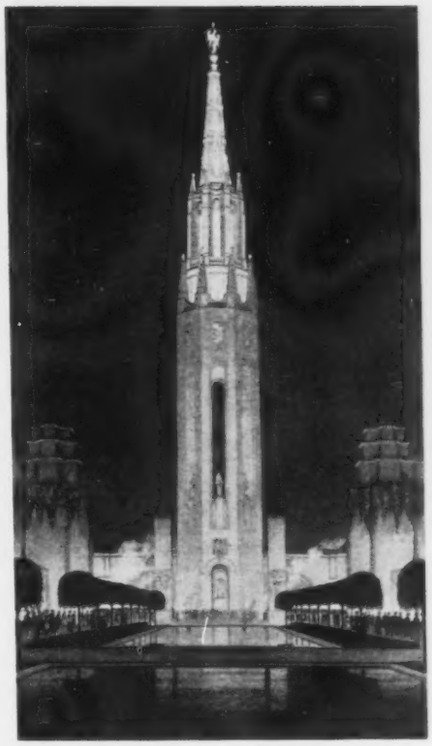
Beyond the Central Court and at the end of the north-south axis will be the Court of the Fables, terminating in the South Gardens. Moonlight blues and greens properly comprise the color motive with scattered amber spots for highlight contract. Green lip-lighting for the pools and glass panels set flush in balustrades will be supplemented by standards interspersed among the shrubbery and hundreds of tree lanterns.

At a right angle from the Central Court, along the main east-west axis, is the Court of Reflections. This is a sort of elongated mirror lake reflecting the coral walls of its enclosing buildings, enhanced by pink fluorescent tubes. Flush glass panels set into the bases of decorative flagpoles will mark the paths.

Court of the Rising Sun

The Court of the Rising Sun, just beyond, will be a golden plaza, embellished by urns, trees, fountains and falls. A rather grandiose Temple of Music has been discarded in favor of a lagoon paralleled by a semicircle of structures portraying the cultural civilizations of the Pacific. This vista is terminated by the Federal Building.

A barge carrying twenty-four 36-in. searchlights will be moored off the south or Yerba Buena end of the island, to provide a culminating aurora. Between this barge and the south seawall will be a replica of Old Faithful speeded up to erupt every fifteen minutes in rainbow jets. This sector will be the scene of water pageants and



Model of the Spire to the Sun

"water-musicks," with effects of colored steam.

Roadway approaches will conform with exposition lighting practice, and even the amusement concessions must eschew any selfish intensities of "naked" lighting and conform to the general standards and prohibitions set up by the Illuminating Council.

Build First, Embroider Later

Many exterior lighting details are yet to be worked out because it has been wisely decided to build the palaces first and then embroider them on the job instead of via blueprint. Thus it will be readily seen that the interior lighting, dependent as it is upon exhibitional characteristics and the locaton of aisles, which total nearly one-third of the floor-space, is still a matter of determining standards and testing the efficacy of various lighting units. This is further complicated by the fact that there may be no ceilings to the twelve typical palaces other than their curving roofs and forests of beams and struts. It may be neeessary, therefore, to improvise a ceiling of high-intensity light.

Greater progress has naturally been made with the group of three permanent structures at the south end. The semicircular Administration Building, which is later to become an airport terminal, is now structurally complete, and the dual objective of the lighting committee has been a layout which will be satisfactory for the purposes of both its present and prospective tenants. The great concourse, or main waiting room, offers a most difficult problem inasmuch as it is 214 ft. long, 67 ft. wide at the floor, 46 ft. wide at the ceiling and 43 ft. high. It is broken into eleven bays and combines the requirements of a passenger terminal, a series of offices and special feats of civic showmanship. Ten foot-candles or less might suffice for pedestrian parts of the floor whereas 45 or 50 foot-candles would be essential nearby.

The hangar-to-be just back of this building will house an aviation exhibit during the fair and will be subject to the uniform standards decided upon for its temporary relatives.

Its twin, however, may be destined to be the mecca of art enthusiasts and connoisseurs for 288 days. Its 287x335 ft. of floor space, unbroken by pillar or partition, offers an opportunity for experiment in what is perhaps the most exacting of all lighting fields—the proper display of art works. Present plans call for its subdivision into 72 rooms of various sizes, ranging from a lecture hall and main picture gallery down to the small cubicles essential for the appreciation of etchings and water colors.

Working on Problems

To "scout" problems which will have to be met before this display is installed, Leo Gianini, illuminating engineer for the Incandescent Lamp Division of the General Electric Co., and his fellow-consultants have had erected in the Pacific Gas and Electric Co.'s laboratory a 12x20 ft. room, a typical cross-section of the Art Palace with the same type of partition. Their preliminary report reads:

"Working on a half scale, prismatic reflectors have been placed at a height of 7 and 10 ft. above the floor in an attempt to find the best height and distance from the wall for the proper lighting effect. Strips of wall 4½ ft. high and 20 ft. long were marked off into 6-in. squares. One hundred and eighty separate readings were taken. Reflectors hanging at half the height planned for installation used prismatic lenses 6 in. square. These lenses, which will be replaced by 1-ft. lenses for actual exhibit lighting, were regulated by ⅛-in. movements in the local length in making the tests. These tests also determined the degree of brightness contrasted between the picture area and the rest of the room."

This, then, is how the exposition will probably appear electrically. It is still too early, however, to give either a technical summary or an inventory of items to be used.

Old Car Barn Turned Into Modern Service Building

Wire fencing and wire hooks (below) make meter storing simple

WHEN street cars gave way to trolley and motor buses in Salt Lake City, the Utah Power & Light Company took advantage of an opportunity to consolidate all of its service departments, scattered in several buildings in downtown Salt Lake City, by erecting a new service building within the walls of one of its car barns. One end of the car barn was converted into a large garage for the operating department trucks and cars. In the other end a three story office and storage building was erected within the existing outside walls.

Electrical layout for the new structure was furnished by the Commercial Service Department of the company and installation of wiring made by Vance Electric Co. of Salt Lake City. Several features of the electrical installation are interesting because of the lighting adequacy provided.

The main office of the service building has 34 totally indirect 300-watt lighting units providing a uniform intensity of 35 ft. candles on the working plane throughout the office. In the superintendent's office in one corner, one 750-watt unit is used. In several other offices where special work is carried on 500-watt totally indirect units are installed. The meter testing room is such a case.

In the storage rooms R.L.M. industrial units were mounted inside the arches made by the concrete pan slab of the floor and ceiling. The side walls of the concrete slab were deep enough to hide the unit itself, but the illumination from the unit was spread over the area in a satisfactory manner. The ceilings in this part of the building are unfinished. Therefore all illumination is direct light from the R.L.M. 200 watt units, and not reflected to the ceiling.

The garage area with an exceedingly high overhead space is lighted by means of 200-watt R.L.M. reflectors on 12 x 15 ft. centers, 35 ft. above the ground. Because of the long runs from the panel board, No. 10 wire is used on all lighting circuits in the garage, and resulting tests have shown no appreciable voltage drop.

At one end of the garage a car washing rack has additional lighting from four angle reflectors mounted 12 ft. above the ground and lamped with 300-watt bulbs.

Control of the lighting in the garage and in the main office is by means of fuseless multi-breakers which act both as control switches and as circuit protection.

One useful idea developed is that partitions in the storage spaces consist of heavy wire fence mounted on pipe fastened to the ceiling beams and floors. This provides for ventilation between the various storage areas and likewise makes possible moving of partitions more easily and without necessity for tearing down masonry.

George Hackwell, in the meter department, brought forth another novel idea for the support of meters in the meter and relay storage room. Rather than mount the rack made of pipe and angle iron which had been used in the former meter room, it was decided to save space and utilize the wire mesh of the partition to support the meters. Mr. Hackwell designed a simple hook of galvanized wire, uniformly fabricated to the required shape and affixed to the wire mesh as shown in an accompanying illustration. According to Hyde Staymer, foreman of the meter department, these hooks are so arranged that a man can carry two meters, one in each hand, and easily hang them them on the support with one hand apiece.

Meter testing is done in a separate room from that in which the meters are stored. A dumb waiter connects the two departments, separated by three floors. Not more than a few meters are kept in the meter test room at one time and convenient dollies on casters are being designed to facilitate the handling of these meters both in the meter test room and in the store room.

Another advantage provided by the new service building is a small auditorium in which meetings of employees or groups of the industry may be held. The Utah Chapter of the International Association of Electrical Insepctors now uses this as its regular meeting room. Lighting units in this room are so switched that the two units at the front of the room alone may be turned on to concentrate attention on the figures or program, while the remainder of the room can be in comparative darkness. Provision is also made for use of steriopticon and other projection apparatus.

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SODIUM VAPOR LIGHTS will be installed by the City of Los Angeles at 22 highway intersections in the southwestern part of the city near the municipal airport.

Main office of the new Utah Power & Light service building

Entrance Cable Restricted in San Francisco

Service entrance cable is no longer permitted to be run concealed in San Francisco. For a time, Chief of the Department of Electricity Ralph Wiley, permitted its use concealed for the sake of a neat appearing job, but has found by experience that this is not safe practice, he said. Fires developed two or three weeks after new installations were made. It was found that nails had been driven through the cable which did not develop leaks until several weeks after occupancy. Service entrance cable, he pointed out, is approved in the Code where overload protective devices are installed before its entry to the building and provided the cable is not concealed. Chief Wiley says he will permit the use of the cable unconcealed on old installations where service increases are necessary, but it is likely that such installations will be required to contain three No. 4 wires or larger.

Another difficulty developing was that not enough lead wire was left at the end of the cable for connection to a larger switch in case of increased load. Usual installations were made with a 3-pole, 30-amp. switch and the cable cut off to supply it proved too short for an increase to a 60-amp. switch and required a complete new installation.

On the other hand No. 4 wire is rather heavy for connection to a 30-amp. switch and makes an unworkmanlike installation. Far better results are obtained by a conduit service entrance, he claimed, where larger wires can be pulled in later. Trouble also developed at the service head fitting. The same fitting was used for all purposes and very often, where cable was run concealed, the ends of the cable came out at a right angle instead of at the angle required, and water seeped in and damaged the cable.

Figures are being obtained as to the relative costs of 1¼-in. conduit with three No. 8 wires for a service entrance job as compared to service entrance cable.

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NEW ANGLES IN THE INSTALLATION of plug-in strip have been announced by National Electric Products Corp. in recent booklets sent to contractors. They are: First, a new line of fittings to adapt plug-in strips for lumiline lighting. Second, a change in construction of the plug-in strip itself—inserts are now assembled at either 6 or 18 in. centers in the standard 1, 3 and 6 ft. lengths of the strip. Third, a publication, called "Typical Example for Estimating 'Plug-In' Strip Installation," with work sheets for use in estimating.

Bent at Home, Shipped to Hawaiian Job

Applying shop production methods to a field job takes a little planning but it pays in lowered costs. This was found true by the H. H. Walker & Co., electrical contractors of Los Angeles, on a number of installations. For example all the 3-in. conduit bends for the underground transmission line job at Hickam Field, Hawaiian Islands, for the U. S. Army, are being bent in the shop in Los Angeles and shipped ready to go into the job. A total of 119 bends of 36 to 3 radius on 3-in. conduit were made in the yard in back of the Walker building by means of a hydraulic jack and heavy steel frame illustrated here.

The same method was used in bending the heavy pipe installed by this contractor in four of the five pumping plants for the Metropolitan Water District. In the latter case the hydraulic jack was used on a platform upon which all the pipe bends were made. Pipe was bent to templates and then coupled together in the concrete form.

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New Uniform Ordinance Issued by P.C.E.B.

A new edition of the uniform electrical ordinance, as prepared by industry committees under the auspices of the Pacific Coast Electrical Bureau, is now ready for distribution, according to Frank Kiefer, northern California representative. The predecessor code had been adopted by 60 cities and towns and by four counties in California.

The uniform ordinance standardizes wiring practices and methods, minimizes the need for special local rulings and in its present form can be adopted at a saving to cities and counties. The code is written so that it can be adopted by reference and copies of the ordinance are furnished those communities who do so.

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EXTENSIVE LIGHTING MODERNIZATION work was started last month in the Commerce Bldg., Vancouver, B. C., following award of a $5,000 rewiring contract to C. C. Carter.

Residential Lighting Forum Held by I.E.S. Section

First of its kind in the vicinity, a residential lighting forum was called together by Bob Dearborn, chairman of the Illuminating Engineering Society, residential lighting committee, and Dave Reid, Pacific Gas and Electric Co., Nov. 9, in San Francisco. A large attendance of fixture dealers, fixture manufacturers and members of the lighting industry met for the first time under this forum arrangement. Among the speakers was A. W. Ray, superintendent of Sausalito schools, who discussed the necessity for good lighting in the home as an adjunct to proper lighting in the schools. Dr. Leland Brown, Stanford University, also discussed the lighting problem.

R. A. Balzari, president of the McGraw-Hill Co. of California, spoke on behalf of the consumer. He declared that what the public wants of lighting fixtures in the home is: beautification of the home, health protection from eye strain and nervous disorders; that the beauty of home furnishings be brought out, harmony of the room be enhanced, happiness and pleasure of the family life increased; it wants economical cost of operation, convenient use, easy cleaning, ease of operation and flexibility of control to obtain a variety of pleasing effects.

Fixtures in the past have been designed, Mr. Balzari declared, chiefly for their appearance under daylight conditions and not under operating conditions. He stressed the need of getting together to study the problem, plan a program and to launch a consistent effort. Otherwise some other organization seeing the opportunities in such a vast market may beat the industry to the sale. The replacement market, he said, would lead into the new market and afford a security of business and opportunity for fixture people for several years to come. Cooperatively, he said, the thing could be accomplished.

As a result of the meeting, the subject for the next forum was selected from among a large list of possible topics. That chosen was a discussion of the methods by which to raise the standards of public acceptance and thus improve the fixture market.

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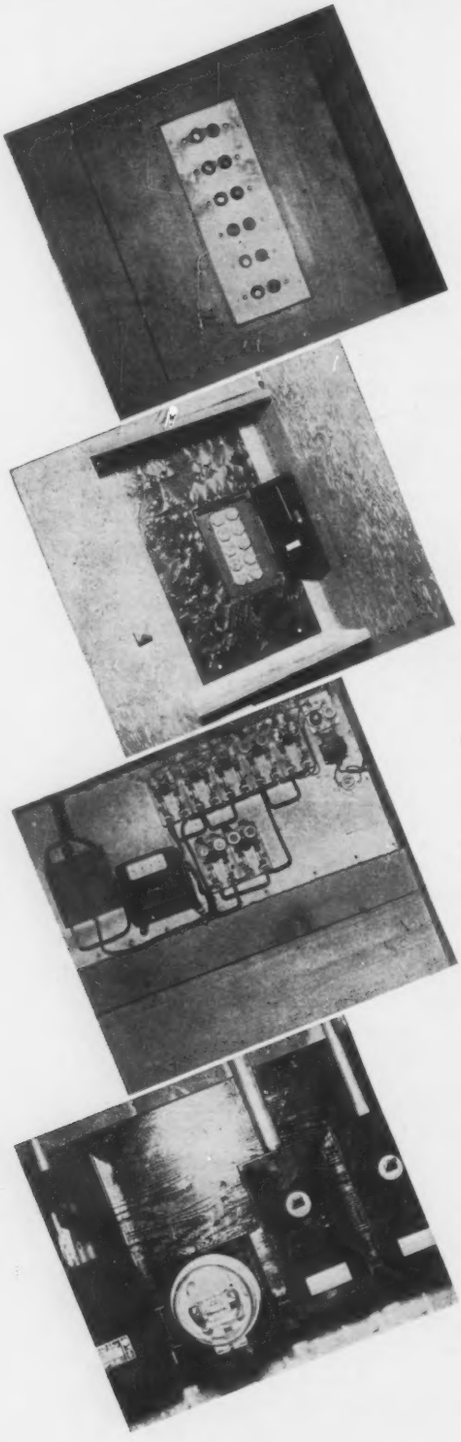
POSSIBILITY OF A BRAND NEW USE for sodium light was opened up recently when Capt. A. H. Reed, harbormaster at Vancouver, B. C., recommended that such lights be installed to aid navigation of Second Narrows in foggy weather. The recommendation was approved by local towboat captains.

Better Light Comes to the



Library—

Volumes of condensed learning on the shelves of our libraries, yet practical knowledge of the use of light seldom is applied in the building itself. Many of a library's patrons have long passed the school days, and vision does not improve with age. Therefore nothing less than good school lighting principles should apply to library lighting. San Anselmo Public Library was thus considered

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Above, at top of page, one-half of the library before and after relighting. Total dimensions of the library are: length 68 ft., width 28 ft., ceiling height 15 ft. Reading areas are located across the front of the building on either side of the entrance offset; book stacks along the back, with librarian's desk in the center opposite the entrance. Formerly lighted as shown left, by luminous bowl semi-indirect 200-watt units suspended 8 ft. from floor, spaced 20 ft. apart lengthwise and 8 ft. crosswise. At various intervals parabola shaded lamps were used over book stacks, some lamped with 60-watt lamps, others empty, the theft of lamps being a problem. Woodwork was dark, ceiling reflection factor 50 per cent, walls and stacks 40 per cent. Glare and harsh shadows were twin evils

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At top, right, the relighted library. Ten 750- or 1000-watt Westinghouse Silvurn units, centered 14 ft. lengthwise and crosswise now light it. For economy four units over reading areas and librarian's desk are 1000-watt lamped; those over the stacks have 750-watt. New total wattage is 8,750 instead of former 1200 watts of ceiling, 1,080 watts in parabola shades, or total of 2,280 watts.. Ceiling, walls, woodwork are to be redecorated later, yet 10-point foot candle meter readings show 31.6 ft. candles in the reading area, and an average of 18.7 around the book stacks (vertical intensities with multiplying factor of 1.25 for full indirect lighting intensity reading with G. E. light meter)

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In the column af left are before and after pictures of the wiring distribution centers. Top is the old push button plate controlling individual lights, a good job in its day. Just below is seen the new control panel, each outlet separately fused and switched, and fed with a pair of No. 12 wires. It is located in a locker so that it may be kept out of sight

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Next is the old main meterboard, main switch and fuse blocks, typical of installation used in small communities 20 years ago. In contrast is the lower picture. The new service consists of three No. 1 wires with branch feeder of three No. 2 to switch panel shown above. Main switch is of 100-amp. capacity with two branch feeder switches of 60-amp. The installation was planned for an eventual 10 kw. of lighting in the library. Installation was made by the San Anselmo Electric Co., James A. Delaney, proprietor

NORTH of San Francisco lies a colorful region of wooded hillsides, well cultivated valleys, busy little towns—the North Bay division of Pacific Gas and Electric Co. Originally settled in Gold Rush days, it has both the old time buildings of former days and ultra modern new stores and homes. Now reached more easily by Golden Gate Bridge it is experiencing a growth which Earl McAlester, lighting bureau representative of P. G. and E., San Rafael, is not slow to convert into new lighting business for contractors and the utility. Old buildings he sells on relighting. New buildings he sells on up-to-date lighting.

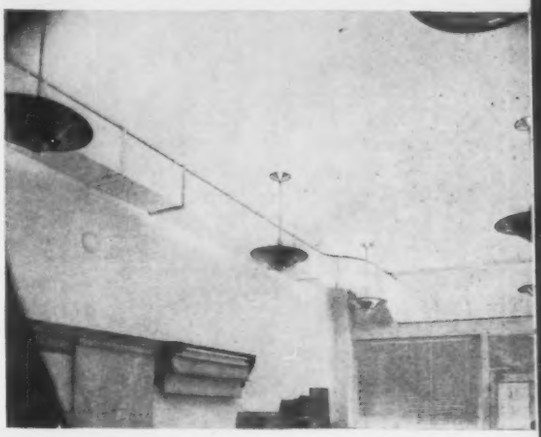
Methodically, Lighting Man McAlester has surveyed his every prospect, prepared a definite follow-up file of them, sends them pamphlets and lighting information to keep their appetite whetted, and eventually he gets his man. To dealers and architects he likewise sends literature so that they may know of the lighting ideas he is trying to develop and that they may assist him by talking the same language to mutual prospects. The pictures of lighting installations found in trade literature, magazines, method pamphlets issued by manufacturers, are interesting to the contractors and architects and suggest lighting ideas to them too. Advances in the lighting art they may thus keep up with and when McAlester talks to them or to one of their customers about a set of lighting recommendations he finds interest instead of ignorance.

Schools—

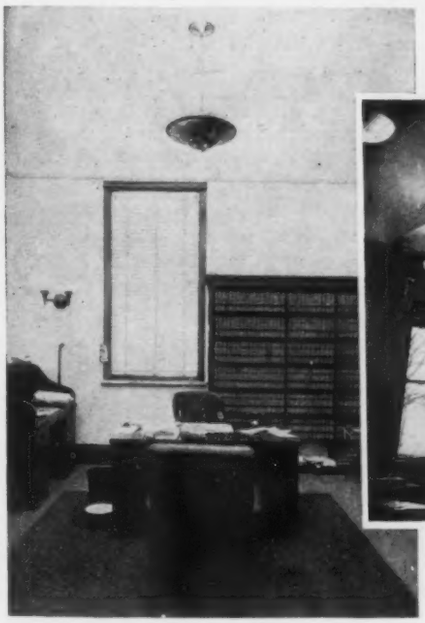
Gradually, a room or two at a time, the schools of the county are being relighted. At right is the 8th grade classroom of the Larkspur Grammar School, with six 500-watt Radio City Silvray units. Ceilings and walls had not been refinished as yet and still 15 ft. candles of light were provided uniformly, whereas without the units, on a rainy day there were but 12 ft. candles near the windows, ½ ft. candle on the last row of desks. With refinished walls 25 ft. candles are expected. Ben Johnson, of Tamalpais Electric Co., in making the installation, ran new feeders of 3 No. 1 wires underground between the several buildings of the school to provide for future lighting installations in all classrooms of the school. The experiment in school lighting being carried on in Sausalito by Superintendent A. W. Ray, now attracting nationwide attention, is in this territory and is influencing the lighting of several other school districts in the region

Drafting—

Thirty-five foot candles is now average on the drafting boards and desks at the P. G. & E. Co. engineering department office in Napa since Earl G. Wilson Co. installed 6 750-watt Silvray units in the 17 ft. by 31 ft. room with its 15 ft. ceiling



to the North Bay Region

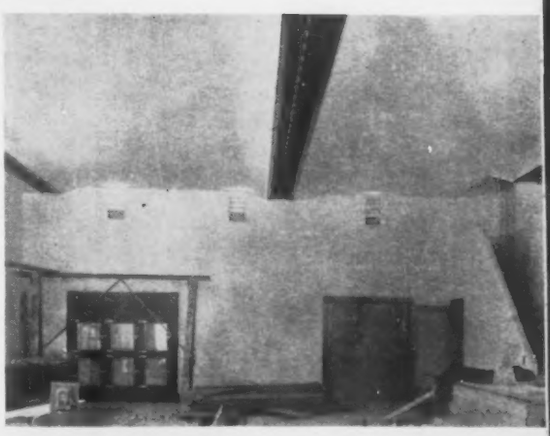


Court House—

Above: Office of Judge E. I. Butler of the Marin County Superior Court in the county seat, relighted with two 1000-watt Silvray units, bringing 25 ft. candles on his desk. In his antechamber is a 1500-watt unit replacing an old tubular bronze fixture with four 32-candlepower carbon lamps in sand blasted glass shades. With repapered walls and white matt ceiling an intensity of 18 ft. candles is now obtained. H. R. Eklund, of San Rafael, was the contractor. Downstairs in the county clerk's office, a room 33 ft. by 36 ft., with 16½ ft. ceilings and ceiling beams projecting two feet below, nine 500-watt Ivanhoe Metro semi-indirect units were mounted on the bottoms of the beams. Wiremold was run along the inside edges of the beams to serve each outlet. This replaced lighting by means of six wall brackets with 75-watt lamps and one semi-direct suspension unit in the center of the room. One foot candle was all that could be had before; now 35 on desks, and 45 ft. candles on the counters is obtained

Market—

At right is a construction view of the Locust market at Mill Valley, where Marin Electric Co. made the installation. Four ceiling troughs, 16 in. wide, with sockets on 15-in. centers, filled with 60-watt lamps, surmounted by a metal reflector painted white, and covered over by flashed opal glass, light the interior. The total of 159 lamps are mounted on Wiremold strip. Outside, on the exterior front, black glass is used. Neon signs surmount the black glass background. This was the first installation north of San Francisco to use both types of glass in P. G. and E. territory



Restaurant—

A break for the business men's luncheon club is the new dining room at the San Rafael Creamery. This 20 by 30 ft. banquet room is lighted in daytime by means of a large skylight over the center—equipped with dense amber hammered glass. Artificial lighting is provided from 4 light boxes, with two 150-watt clear lamps each, inset in the 12-ft. ceiling, and covered over with flashed opal glass

Lighting Course Held in Los Angeles

Popular demand has brought forth a post-graduate course in lighting in southern California. As a result of the lighting instruction work done jointly last year by the Electrical Development League and the Western Institute of Light and Vision, a new series of lighting forums started Nov. 8 and will be continued to Dec. 13. Meetings are held on consecutive Monday evenings from 7:30 to 9:30 p.m. in the auditorium of the Edison Bldg., Los Angeles.

The schedule of subjects for the forum was made up by Frank A. Hansen, Institute director, who conducts the sessions. November topics were: "How We See" by Ernest A. Hutchinson, and "Light Sources" by Frank van Gilluwe, at the first meeting; "Illumination Terms" by Arthur W. Nye, and "Lighting and System Design" by Alston Rodgers, at the second meeting; "Residential Lighting" by Lloyd A. Gates, and "Garden Lighting" by F. B. Nightingale, at the third, and "Industrial Lighting" by Walter A. Alden, and "Outdoor Lighting" by Horace L. White, at the last. "Architectural Lighting" by Foster K. Simpson, and "Luminous Advertising" by George M. Rankin, were scheduled for the Dec. 6 meeting. On Dec. 13 a skit entitled, "Why People Buy Lighting" will be enacted by T. H. Shepherd and R. A. Crosby. "Proper Wiring" will be discussed by Walter L. Stickel.

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General Electric Co. Issues Two Wiring Booklets

"Wiring for the Farm" and "General Electric Home Wiring" are two new publications just issued by General Electric Co., Bridgeport division, and available to the trade. The former has been prepared as a result of a meeting with the American Society of Agricultural Engineers at Urbana, Ill. First part of the book contains a general outline of the necessity for proper wiring in the home and outbuildings of the farm. Second half is illustrated with diagrams showing the application of wiring to the home, cow barn, silo, milk house, garage and work shop, brooder and chicken house and green-house.

The home wiring book is similar in nature but confines itself to the wiring system in the house alone. Interesting is a comparison of the usual or minimum type of job with the several other possible ways in which the house can be wired. A number of diagrams illustrates these methods. Remainder of the booklet is made up of illustrations and data concerning various wiring fittings and materials.

REGISTER OF CALIFORNIA construction contractors for the fiscal year ending June 30, 1938, was issued last month. Listed in the volume, the alphabetical section of a double directory service published annually by the State Registrar of Contractors, are over 26,000 individuals and firms. Geographical section of the directory is promised by Dec. 20.

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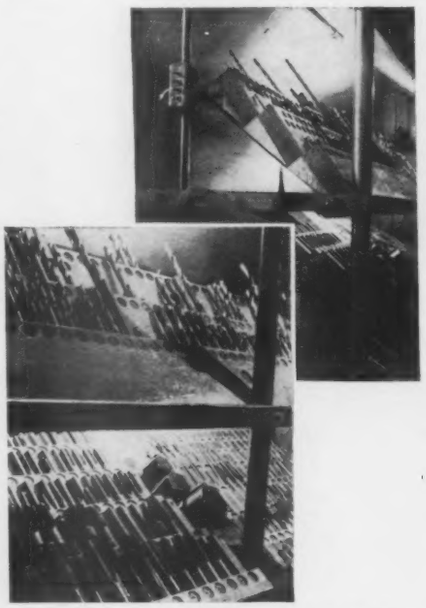
Visible Tool Rack for Drills and Taps

A place for every tool and every tool in its place is a good maximum for any motor service shop. Having a place for every tool helps to keep the tool in its place, Lloyd Flatland, of Globe Electric Works, San Francisco, has found from experience. In his tool room he has built several novel racks for holding tools. One of the most interesting is that which holds drills and taps of large sizes. Arranged as shown in the illustration in a series of steps are planks



of heavy oak with a groove drilled on the surface for each of the tools it is to contain. At the base are a series of shallow ¾-in. holes into which ½-in. knockouts have been placed with a number on them indicating the size of the tool in the row above it. These racks are arranged on an inclined shelf of a framework made of pipe and angle iron. A light over each shelf, controlled by a toggle switch in a gang box at the end the rack, provides illumination for selection of the proper size and type of tool.

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STATE OF OREGON is launching a highway safety lighting program with the installation of twelve General Electric sodium lights on the Portland-Oregon City super-highway at intersections where fatal accidents have occurred.

Vancouver Street Lighting Contract Renewed

Renewal of a five-year street lighting agreement with the British Columbia Electric Railway Co. was approved by the Vancouver City Council recently. Savings which the city will make under the agreement amount to $11,587 a year.

Aldermen over-rode a motion favoring renewal of the agreement for only two years and completion of a survey pointed toward the possibility of installing a municipal street lighting system and plant. Indication was that the city would make no move to increase the intensity of illumination until its present supply of equipment is used up.

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Three More Utilities Start Lamp Drives

Nation-wide campaign for better light-better sight gained further impetus in the last two months when three more Western utilities added their names to the growing list of companies sponsoring lamp drives.

"Fill the Empty Socket" was the slogan of the San Diego Consolidated Gas & Electric Co.'s two-month campaign ending about the first of the year. Every one of the 70,000 domestic customers in the territory received a copy of the National Better Light-Better Sight Bureau's *Better Sight Pictorial* containing a coupon which entitled the recipient to one 100-watt incandescent lamp free with the purchase of a carton of six 60-watt Mazda lamps from any dealer.

Southern Colorado Power Co. conducted October bulb and I.E.S. lamp campaigns. The former, an all-employee campaign, offered commissions and bonuses to any employee selling a 400-watt unit. Customers who purchased 400-watt units during the lamp campaign received from the salesman, either a dealer or an employee, a ticket permitting them to draw each Saturday for an I.E.S. lamp. Number of lamps awarded depended on the size of the district.

Although the California - Oregon Power Co. and Mountain States Power Co. carried on no domestic lamp bulb sales activities, they cooperated with dealers featuring higher wattage lamps by giving away to each person who bought a portable lamp the necessary bulbs. In addition, specially constructed display cases were installed in all major offices of the companies and sales girls, previously given a course in home lighting, were employed to stimulate the sale of higher wattage lamps.

Water Heater Safety

L. A. Bureau Defies Gasmen to Wrap Heaters in Excelsior

STRONGEST selling point in favor of electric water heating has always been that of safety. Out of consideration for the gas industry this point has not been emphasized in the sales campaigns of electric water heaters, at least to the extent in which it might have been used. However, in localities where gas companies refuse to "pull their punches" in some of the claims they make for gas refrigeration and cooking and where electric utilities are independent of gas properties, the safety story is being used to its full potentiality.

The recent campaign of the Bureau of Power & Light in Los Angeles made no bones about the safety of electric water heating as compared to the heating of water by any other method.

"Would you dare do this with a heater of any other type?" was a question asked on a bold poster which cooperating dealers used in their window displays. An electric water heater was connected and shown in full operation while surrounded by excelsior enveloped in cellophane.

In supporting this campaign the Bureau's advertising stressed the economy of electric water heating. Such comparisons as these were made: That the electricity to heat the water for dishwashing costs no more than three soda crackers. Water for a shower costs but one cigarette. Water for the laundry costs but two clothes pins per person.

Twenty prizes were offered to dealers and Bureau appliance salesmen as reward for the most favorable showing in sales made in the company. Unique feature of the contest was that there were no first, second or third prizes. A "Treasure Island" was loaded with a number of gifts and the first man to reach it in sales quota had his choice. The second man selected his prize from the remaining "treasures," the third man from the remaining, etc. The contest closed Dec. 3. One point was credited for each electric water heater sold.

Winners in the electric range derby which closed last month were announced as follows: Class A store salesmen, first prize, Harry Warner, May Co.; second prize, J. Palmer, Barker Bros.; third prize, R. N. Lemmons, Sears Roebuck, and L. W. Workinger, Broadway Dept. Store.

Class B store salesmen, first prize, A. H. Wright, Van Horn Electric; second prize, S. D. Schaeffer, Nutsch Electric Co.; third prize, R. F. Hutchings, Haddox Gas & Electric Store.

Range Dept. Managers of winning department store were C. M. Ferbrache, May Co., as a department store manager, and Charles Markson, Markson Electric Co., retail store manager.

Bureau of Power & Light Appliance salesmen winning prizes were Albert H. Lyons, first; James A. Deegan, second; Charles C. Gherkin, third.

No, this isn't just another picture of a cooking school in session. This is a picture of what is believed to be the first all-electric cooking school ever held in a women's prison. Sponsored by Southern California Edison Co., it was the utility's contribution to the character rehabilitation program being carried out at the California Institution for Women, Tehachapi. In charge of the classes, which were conducted over a two-day period, was Mrs. Ruth T. Erb, well known home economist

Utah Power & Light Sales Exceed Ten-Month Quota

Utah Power & Light Co. sales department exceeded its earned annual revenue quota for the first ten months of the year by 14.2 per cent. Expectation of Sales Manager W. A. Huckins is that the total year's quota will have been reached by Nov. 15.

Residential sales accounted for $45,160 during October, or 123.6 per cent of the month's quota. Considerable new e.a.r. is the result of the current better light-better sight campaign and the Silver Jubilee electric range campaign.

Commercial sales for the first ten months reached 111.6 per cent of quota. Street lighting sales were 119 per cent of the whole 1937 quota.

●

COMPLETELY EQUIPPED with all electrial conveniences and the latest type of indirect lighting features, a new model home has been thrown open for public inspection in the Little Mountain subdivision at Vancouver, B. C. The home was financed and built under the direction of the B. C. Electric Railway Co.

●

FAKE RADIO interference eliminators, neither approved nor listed by underwriters, are being outlawed in San Francisco by the Department of Electricity and police. Ralph Wiley, chief of the Department of Electricity, has found that trick radios cause the devices apparently to perform in demonstration, but that the devices refuse to work on home radio sets when sold. This form of electrical bunco game has been practiced extensively by sidewalk venders.

Christmas Trees Brighten Pomona Streets

Long before the frost was on the pumpkin—even while Pomona's Los Angeles County Fair was in the limelight—a forehanded and industrious committee of Pomonans, headed by Homer L. Duffy of the Southern California Edison Co., completed plans for Christmas decorations of the city streets.

A model erected late in August previewed the installation, which will consist of a number of silver, metallic Christmas trees fastened on to ornamental light standards in downtown sections. These will each be 10 ft. high with a 6 ft. spread at the bottom. Colored electric lights will illuminate the tips of the trees' twelve branches.

Decorations will also include red and gold cloth street banners proclaiming the season's greetings.

Holiday Campaign

"Answer to Christmas Hinting and Hunting"

ELECTRICAL gifts should sell in tremendous volume throughout northern California if every dealer in appliances follows through on the sweeping flood of publicity and advertising, the score of excellent selling suggestions provided by the cooperative efforts of the Electric Appliance Society, the Pacific Gas and Electric Co., and wholesalers and distributors of appliances. Certainly the concentration of the entire industry on the campaign slogan, "The answer to Christmas hinting and hunting—electrical gifts" should center public attention on electric appliances, the participating cooperators feel.

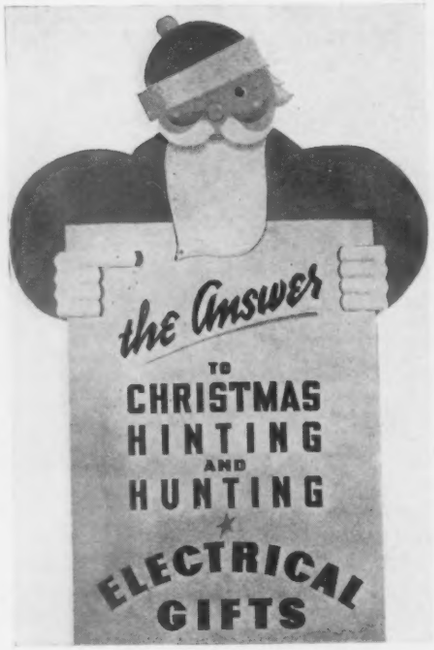
Newspaper ads, a total of 287 in dailies and weeklies appearing during the weeks of Dec. 6, 13, and 20; commercial announcements over the P. G. & E. radio program, "California Tales"; billstickers on 435,000 bills to consumers; a contest in P. G. & E. Progress, and radio spot announcements over 18 stations will supplement the dealers' own use of special display cards for floor and window exhibits, slogan cards for traffic display tables, and dealer advertising supported by

Billstickers, billboards and car cards will suggest electrical gifts in this manner

publicity releases from the Electric Appliance Society on special Christmas appliance pages.

Even suggestions for catchy wording to be used on cards placed on appliance tables, on window cards or in newspaper ads have been suggested in the broadsides announcing the December small appliance campaign. Director of promotion Bert Reynolds urges that dealers who want to cash in to the fullest on this flood of publicity do the following:

1. Feature the campaign theme; 2. Display small appliances on tables where traffic in the store is greatest; 3. Make special displays using the Society's card and manufacturers' materials; 4. Place price tags prominently; 5. Hold demonstrations by skilled women demonstrators; 6. Have plenty



Facsimile of the large floor and window display card, also of the miniature cards for use on display tables

of literature to mail or hand out; 7. Thoroughly post the store personnel; 8. Telephone to prospects, mail customers lists of suggested gifts; 9. Place dummy packages at the foot of a Christmas tree with cards suggesting gifts for various members of the family; 10. Wrap purchases in appropriate paper, provide gift cards; 11. Play up the campaign slogan in all advertising.

●

New Refrigerators Make Their Appearance

Like automobiles, electric appliances now come out a year in advance. In 1935 one or two refrigerator manufacturers brought out 1936 models in December. In 1936 others announced 1937 models around Christmas. But this year several of the major manufacturers in the refrigerator field have stepped ahead their production schedules and now new models are announced as early as November.

Frigidaire was one of these, bringing forth at a special fall buyers market in Chicago not only a new line of refrigerators but also a new range and washing machine. Range talking points include porcelain cabinet, Chromolox cooking units, a simmer cooking unit, a well cooker, 14x16x18-in. oven with rustproof seamless lining, hydraulic thermostat and other features. Glass wool is used for insulating the oven. Price range has been announced from $129.50 to $199.50, in five models.

The 1938 Frigidaire refrigerators claim another slash in operating costs derived from changes in design and construction both of the mechanical units and the cabinet. A quieter operation gives rise to a new name for the unit, "silent meter-miser". Improvements in the "quickube" tray, together with refinements of design and arrangement, constitute the only major changes. Price range announced starts at $119.50, jumps to $164.50 for the special line and runs to $409.50 for the Imperial. Master line starts at $144.50 and deluxe line at $209.50. These prices include the regular five dollar protection plan charge.

Westinghouse likewise brought out a new line in November. Features of the 1938 Westinghouse include a "Humidrawer", a built-in humidity storage for large quantities of vegetables and fruits. This is located at the bottom of the food compartment and slides out when in use. A transparent glass top serves as a bottom shelf for the food compartment and a top for the drawer itself, thus permitting the housewife to see exactly what fruits and vegetables are stored in this compartment.

Another feature is a meat storage compartment placed directly under the froster and serving as a defrosting tray. The compartment holds 10 lb. of meat and is easily cleaned. It is made of white procelain. With the low temperature possible in this location the moisture is retained for a longer period and meat has less tendency to dry out.

Advantage of bringing out models early is said to be that of providing 1938 models for the Christmas trade, stimulating more winter sales of refrigerators and coinciding better with the shows and expositions held before the Christmas season.

Electric Exhibit in Oil Show

The close tie-in between the electrical and oil industries was graphically illustrated at the recent Pacific Oil Show in Taft, Calif., by the exhibit of the San Joaquin Power Service. Designed and installed by J. U. Berry, display manager for the Valley Electrical Co., the booth displayed enlarged photographs of generating plants and substations serving oil-field territories in the background, lists of the many fields served by the company in the foreground

L. A. Fair Exhibits

Electrical Displays Cover Lighting, Health, Pumps

EDUCATIONALLY, electricity contributed more than its share at the recent Los Angeles County Fair, Pomona, Calif. Not only were appliance exhibits numerous but the utilities and the Western Institute of Light and Vision conducted educational displays, effect of which should prove far reaching in stimulating public demand for better electrical facilities.

Significant was the fact that the Western Institute cooperated in two displays in the Los Angeles County Schools exhibit. A miniature school room recently developed by the engineering department, General Electric Co., Nela Park, was seen by more than 200,000 people. Operating automatically through several cycles of lighting conditions, it illustrated the school room illuminated only by natural light; illuminated with a combination of artificial and daylight, and the use of the photocell to turn on the lighting equipment as the natural light faded.

The other display in the school system exhibit was that of a model school room. This was installed in an alcove and equipped with good lighting and photo-electric-cell control. To illustrate daylight, a flood light was trained to shine in through the windows. A dimmer handle on the counter operated the "daylight" and dimmed it to the point at which the photo-electric relay switch operated the lighting in the room.

Southern California Edison Co. and the Western Institute joined in a novel educational display on the health value of electrification in the main exhibit building. Nine displays, each individually motor-driven, were arranged progressively to tell the story of light, its application and control. These, too, came from the engineering department of General Electric Co. Modern vision-testing equipment with a rotoscope which indicated the degree of muscular unbalance between the two eyes proved fascinating to the people who took the test.

Another section of the booth was devoted to an educational display showing the need of electric refrigeration. By means of a short lecture illustrated with slides of live bacteria, the need of refrigeration in preservation of food and the control of bacteria was graphically presented.

Exit from the exhibit was made through an attractive all-electric kitchen display bearing the slogan, "Temperature Control for Better Health".

Model school room display

Electric pumping was also exhibited in the agricultural display tent. Displayed were two electric pumps, continuously discharging water over various levels of illuminated glass brick steps into a large concrete pool, into which nine of the latest model pumps of various manufacturers also threw streams of water. A glass brick terrace, behind which colored lights flashed on and off, made a colorful waterfall scene for a background.

●

F. D. Vincent Building Fully Equipped Home

Ensemble selling has been applied to women's wear, home furnishings and even appliances, but it took Frank D. Vincent of Vincent Electrical Appliance Co., Los Angeles, to carry the ensemble plan to the ultimate conclusion. His idea is to build and sell a home complete with appliances.

His first General Electric charm home is now being built in Westwood, Los Angeles. The kitchen includes range, water heater, refrigerator, dish washer, garbage Disposall, Mixmaster, roaster, washing machine, electric ironer and full complement of appliances. The home will be heated with Thermador electric heaters and "head-to-heel" electric heaters in the bath rooms. Even dishes and silverware are to be included in the final product.

●

NORTHWESTERN ELECTRIC Co.'s six-week laundry equipment campaign, which ended recently, resulted in the sale by dealers of 1,261 washers, 203 ironers.

NOT ONE BUT THREE model kitchens have been installed in the kitchen appliance division of J. W. Robinson Co., department store on Seventh St., Los Angeles. One kitchen is that of General Electric, another is Westinghouse and a third is a combination featuring a Woolwine range, Frigidaire refrigerator and appliances of other makes. A kitchen planning service is also offered to customers of the store.

●

MORE THAN 1,200 WOMEN attended the electrical cooking school conducted at Hemet, Calif., by the Nevada-California Electric Corp. Oct. 4-6. In charge of the program were Misses Jean Smith, Mary Grant and Ellen Roe, company home economists.

●

Washington Water Power's Range-Heater Drive Ends

Washington Water Power Co.'s six-month electric range and water heater campaign came to a close Oct. 2 with a total sales report of 1,575 ranges and 1,481 water heaters. Of this number, dealers accounted for 830 ranges, 303 heaters.

Given permanent possession of the J.E.E. Royer trophy, awarded to the team attaining the highest percentage of quota, was the Okanogan division under C. Rea Moore. Losing team was the Spokane Northside division.

In this manner the Washington Water Power Co. rewarded sales divisions in its recent range and water heater campaign. Above, Lewis A. Lewis, assistant general manager in charge of sales, presents the first prize trophy to the Spokane division, August winner. Below is J. D. Lewis, inspecting the doghouse and accessories which went to him as head of the Palouse division, tail-ender in August

"Give Something Electrical for Christmas"—R.M.E.L. Slogan

"Give Something Electrical for Christmas" is the Rocky Mountain Electrical League's message to the public this month. The slogan will be flashed throughout the Rocky Mountain region in a series of blanket radio broadcasts so worded that they will apply to every locality and by means of posters printed by the league and distributed to members and dealers.

Additional stimulus will be given the drive by the Denver league's annual Electrical Exposition held at the Shirley-Savoy Hotel Dec. 8-11.

●

OCTOBER WINNER of the prize money awarded by Utah Power & Light Co.'s Electro Dealer magazine for the best I.E.S. lamp display was the Dixon-Taylor-Russel Co., Provo.

●

WARREN TELECHRON CO. has announced inauguration of a series of theater advertising sound film shorts to aid the dealer in publicizing his store in conjunction with Telechron self-starting electric clocks. The new sales films are produced by the Modern Display Co., Chicago.

●

UNDERWRITERS' LABORATORIES, INC., has announced that the re-examination service in force on cord sets will be discontinued April 1, 1938, and all approved sets will thereafter be identified by a blue label. Labels will be available Jan. 1 and may be applied subsequent to that date.

SUN LAMP ROASTED —By Russell

If it will only brown this bird like it did Junior's back the dinner is a success

APPLIANCE SALES REPORT

A Summary of Dealer and Utility Reports Compiled by Associations, Societies, Bureaus, or Dealer Contact Departments of Utilities

October, 1937	L. A. of P. & Lt.[1]		Bureau		Idaho Power Co.[2]		P. G. & E. Co.[3]		San Diego Cons. G. & E. Corp.[4]		San Joaquin Lt. & P. Corp.[5]		Southern Calif. Edison Co. Ltd.[6]		Utah Power & Lt. Co.[7]		Wash. Water Power Co.[8]	
	†Current	‡10 Mos.	Current	10 Mos.	Current	10 Mos.	‡Current	‡9 Mos.	Current	10 Mos.	Current	10 Mos.	Current	10 Mos.	Current	10 Mos.	Current	10 Mos.
Ranges			204	4,039	431	3,632	50	470	105	1,443	543	5,966	220	3,869	169	1,938		
Water Heaters			133	1,953	214	2,128	45	468	67	745	194	2,286	40	1,444	155	1,662		
Air Heaters, aux.			121	352	246	6,632	65	1,150	61	310	321	2,382	59	977	220	1,046		
Air Heaters, 220					106	948			69	693								
Refrigerators			138	5,280	3,491	43,058	825	7,250	180	5,836	3,371	45,570	753	9,735	293	7,297		
Dishwashers			1	16	17	181			3	35			2	44	5	12		
Washers			285	3,187	2,797	27,130	400	3,275	411	3,597	3,727	29,382	929	8,221	673	5,312		
Ironers			31	375	923	6,547	75	630	60	605	513	4,518	60	500	76	503		
Vacuum Cleaners			87	1,067	2,471	26,037	200	1,970	163		1,198	11,209	326	4,659	339	2,483		
Radios			728	5,773	8,435	89,466	975	8,600	854	5,431	6,139	45,370	1,799	10,502	1,592	10,585		
Mixers			68	634	398	5,882	150	1,185	34	492	373	3,679	141	1,792	152	1,465		
Cookers, Casseroles			14	283			90	735	45	1,425	126	898	45	827	210	3,126		
Irons			573	4,198			500	4,650	440	3,349	1,573	14,498	1,225	10,921	1,110	8,168		
Waffle Irons			146	1,219			175	1,600	106	828	541	4,363	358	3,535	234	1,750		
Toasters			201	1,665			350	2,950	166	1,298	756	6,255	595	5,233	657	4,194		
Table Stoves			156	1,488			100	720	115	983	352	2,692	796	8,213	115	2,100		
Heating Pads			94	507			75	1,260	49	885	240	2,299	187	2,032	195	1,263		
Curling Irons											53	522	197	2,797				
Coffee Makers			142	1,622			375	2,925	175	1,151	392	3,328	878	4,824	709	3,887		
Sewing Machines			9	149	816	11,120	60	810					138	1,311	103	590		
Clocks			59	520			450	4,275	325	1,431	647	5,309	335	3,608	329	2,585		
Fans			10	1,451					20	1,826	122	4,278	116	2,199	33	2,353		
Floor Polishers																		
Sun Lamps			3	52							37	380	8	98	6	22		
Reflector Lamps			434	2,417					155	1,506			686	7,218	1,836	8,820		
Miscellaneous Lamps			660	3,678					182	980			814	7,426	738	7,050		
Yard Lights									43	480								
Misc. Small Appl.									66	1,364	655	6,818						

APPLIANCE

Sources:

[1] Compiled by Los Angeles Bureau of Power and Light for territory served by that system.
[2] Figures compiled by Electric Equipment Sales Association. Include power company sales and sales of all reporting dealers—about 60%.
[3] P. G. & E. reports sales of major appliances only based on accurate reports available from dealers' accounts. Ranges, water heaters and air heaters include company and dealer sales. Total dealers include gas as well as electric dealers.
[4] Gathered by Bureau of Radio and Electric Appliances of San Diego County. Estimated monthly sales figures used in this table: Clocks, fans, included under miscellaneous.
[5] Includes dealer reports from Midland Counties Public Service Corporation also. Compiled by Valley Electrical Supply Company.
[6] Includes reports from dealers on San Joaquin Valley system of company as well as Southern California areas served.
[7] Includes Utah Power & Light Company territory in Utah, Idaho and Wyoming. Also Western Colorado Power Company territory.
[8] Dealer sales only for Spokane and company territory. Company sales not included. Table stoves, grills included with cookers.
† Under current month heading is shown previous month's figure. Lag of one month is also shown in total sales for year to date, which began December, 1936.
‡ October report was not available at time of going to press.

1.
Lead the prospect to the sunlamp department. Select one model. Turn on the light. Let her feel the warmth of that light on her hands.

2.
Explain the adjustments for height and control of the distance of the light from the person taking a sunbath. Tell of it in terms of convenience to her.

3.
Comment on the finish and how it will tone in with the decoration of any room; become an attractive piece of home equipment.

4.
Show how easily the lamp may be moved, either on its castors or by rolling the base. Tell of this in terms that mean it can be used in any bed room, in the bathroom or in living quarters at will.

ELECTRICAL WEST
COOPERATIVE

APPLIANCE SALES GUIDE

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Points to

SUNLAMPS

Demonstrate

December, 1937

When You

Sell Electric Sunlight

5.
Seat the prospect comfortably while you explain the action of the artificial sunlight, what it is good for, how it should be used.

6.
Explain artificial sunlight in terms of daily or regular doses of sunshine. Avoid making any medical or curative claims. If you have the recommendation of any local physician use even that carefully and refer any questions of doubt as to the application of a sunlamp to the judgement of her physician. Offer to submit to the doctor, if he is skeptical, the scientific data made available to you by the manufacturer of the lamp.

7.
Explain how the automatic timer can be set to regulate the dosage, and show by actual demonstration how it turns off the electricity at the precise time set. Tell of this in terms of protection against any possible over exposure and sunburn. Then explain that the use of a sunlamp at bedtime is so relaxing and quieting that it promotes sleep and rest.

Reasons for Buying—

(Talk them to sell your prospect)

- Conserves health for the healthy . . builds resistance
- Supplies missing sunshine during winter months
- Preserves a healthy appearance, with good tan and color
- Easy to take, easier than outdoor sunbaths for most people
- Can arrange sun baths to suit your own convenience as to time
- Saves time spent taking children to clinics
- Saves expenses, for it operates at less cost than an iron
- Reliable source of sunshine at your own command
- Quality is always the same; with sunlight it isn't
- Relaxes and refreshes, promotes restful sleep
- An aid to better health because it helps supply sunshine vitamin D, thus helping the body absorb calcium from foods and build sounder teeth, strong bone, and resistance to infection. Easier to take than cod liver oil

No. 12A

SHORT SALES TALKS
That hurdle Sales Resistances

Sunlamps

SUNLAMPS are *accepted* now. There is money to be made in selling them, for the pioneering of these *aids* to health and strength is now behind them. Many physicians not only use sun lamps themselves but recommend the use of them at home to their patients for the preservation of health and the building of resistance to colds and ills. Last year a number of dealers who advertised, displayed, demonstrated, and sold sun lamps found them excellent winter merchandise. Right after Christmas, especially, when the darkest days, the coldest or rainiest weather prevailed, these dealers made sales while the real sun was not shining. A dealer does not need to go into the medical side of sun lamps. No need to argue whether they bring benefit to users. Reliable makers offer you proof data. It is necessary only to make an attractive display, one that suggests outdoors and sunshine, invite your prospects by letter and advertising, demonstrate the operation of the sun lamp, and then sell them on the known benefits that come from the USE of artificial sunshine in the prospect's own home. The commonest resistance to such sales Bill Smith, the successful salesman, meets and overcomes here in a way that you can do yourself whenever the same question arises.

When the prospect says—

***Prospect:* "Just what does a sun lamp do for you?"**

HERE you have a very common resistance—ignorance of what the sun lamp really accomplishes. Either a sun lamp has been recommended to the prospect, or she has a half formed idea developed from reading an advertisement or some magazine article describing them. But real knowledge is scant. Moreover there is danger in overexplaining and causing still more confusion, or of making extravagant claims which will bounce as dissatisfaction or disappointment. Likewise a salesman must guard against insulting a prospect by inferring ignorance. Bill Smith usually meets such an inquiry like this:

BILL SMITH: "What does a sun lamp do? That is a very worthwhile question. It shows that you are a person who wants to look before leaping, to investigate before buying, and I don't blame you. It is the intelligent thing to do. In a very few words, a sun lamp does for you just what good summer sunshine does. It is not a cure for everything anymore than sunshine is. But it does aid you to keep in healthy condition if you take sun baths regularly. That is worthwhile, isn't it? It is better than just health insurance, because it minimizes illness rather than paying for the expenses of illness. You can build up your resistance to colds and flu. You can prevent rickets in children. You can keep the whole family from getting run down during the long winter months when real sunshine is so scarce and what there is of it is so thin. It is far more fun to relax under nice warm sunshine like this than to take tonics, and a lot better for you. Wouldn't you like to have me send this one out for you so that you may keep your family and yourself in good health all this winter?"

When the prospect says—

***Prospect:* "Are you sure it is safe? I have heard that too much of it is bad, and some people get burned by a sunlamp."**

PERFECTLY natural obstacle this one. A sensible one, too, for imprudent users have overdone the use of sun lamps in some cases. Others have gone to sleep under one and have been burned. But that is not the fault of the lamp. Be careful, however, how you handle this question. It will not do to belittle or ridicule, for that can react against a salesman very materially. Try this technique of Bill's. (And notice he always ends his sales answer by asking for the order.)

BILL: "Safe? Most assuredly. Though I don't blame you for making sure on this point. It shows prudence and caution that will save you from medical quackery, I am sure. The best way to answer your question is to compare this lamp to sunlight—which after all is just what it produces—artificial sunlight—no more, no less. You can get badly burned if you go to sleep or expose your skin too long at the beach or when swimming, can't you? But here is an advantage that comes only with this electric sunshine. You can measure the amount you should take and get just that amount each time. When you can control sunshine like this, you can't overdo it. You cannot turn off the sun, when you have had enough, but you can turn off the electricity, and that is just what this little gadget here does. You turn this

knob here to the number of minutes of sunshine that you want and this timer ticks off the time and shuts off the current for you without another thought. Even if you should relax and go to sleep while taking a sun bath this little watchman would see to it that you did not get more than is good for you. Let me send you this model with the time minder on it, shall I?"

When the prospect says—

Prospect: **"Doesn't it cost a lot to own and operate?"**

IN almost every sale the question of cost comes up. Be prepared to face it and hurdle it as Bill Smith does here:

BILL: "'Cost a lot?'" A very pertinent question. Yet isn't cost a relative thing in this case? For instance, what does it cost to be sick? What does it cost to be run down, or susceptible to everything that comes along? Far more than a dozen sun lamps, plus lots of electricity, isn't that true? Let's look at sunshine as prevention instead of cure, as insurance against rather than patching and mending ill health. That is far more worthwhile, isn't it? Here you have a means of bringing sunshine right into your own bedroom at home at the cost of but a few office calls to the physician. And the electricity to make sunshine for you costs only a few cents a month. You can suit your own convenience rather than fit your time to appointments. Here is a preventive and protecting device that will pay you dividends in a sense of fitness and health, in a good color throughout the winter, in a feeling of security against infections and just plain joy of well being. Do you know, you would be wise to have this health bringing sun lamp sent out to your house this afternoon so that you could start using it tonight. Would you like it delivered or will you take it home in your car?"

When the prospect says—

Prospect: **"I should think it would be a bother to use it regularly, as you recommend."**

THE idea of routine or regular thought and attention is a big stumbling block to people whose habits are fixed and who might be disturbed by something new. That is why habit is the hardest resistance in all selling. Yet, stop to think, once the prospect readjusts habits to include the regular use of a sun lamp the difficulty will remove itself. The hard problem is to get such people to take the initial step.

BILL: "You wonder if it might be a bother to use it regularly? That's an interesting point and I am glad you brought it up. You appreciate the value of regularity in the use of this lamp to get you full money's worth from it. When a new thing is eminently worth adding to your daily life, I am sure you find a way to include it, don't you? Especially when it brings with it a reserve of vitality that makes you feel fit, helps you ward off colds and illness, keeps your color and makes you healthy and well, just as good sunshine every day would do if you could always get it. Many of my customers tell me they have made it a sort of daily ritual. One man I sold a lamp to turns it on while shaving every morning. He never loses any time that way. Others use it while in the bath or washing the hair. The sun lamp helps keep the bathroom warm and cosy and adds light by which to see to shave better. Others like to take their sun baths just before retiring. They find that it relaxes and soothes them and they can go right off to restful sleep after a sunbath. Here is a suggestion. I'll send the lamp out this afternoon early and you can begin to experiment for yourself tonight or tomorrow morning. In that way you can find a time that best fits in with your own family program. Shall we do that?"

S C
CALIFORNIA OREGON POWER CO. · PORTLAND GENERAL ELECTRIC CO.
MOUNTAIN STATES POWER CO. · PUGET SOUND POWER & LIGHT CO.
PACIFIC POWER & LIGHT CO. · IDAHO POWER CO.
NORTHWESTERN ELECTRIC CO. · WASHINGTON WATER POWER CO.
UTAH POWER & LIGHT CO.
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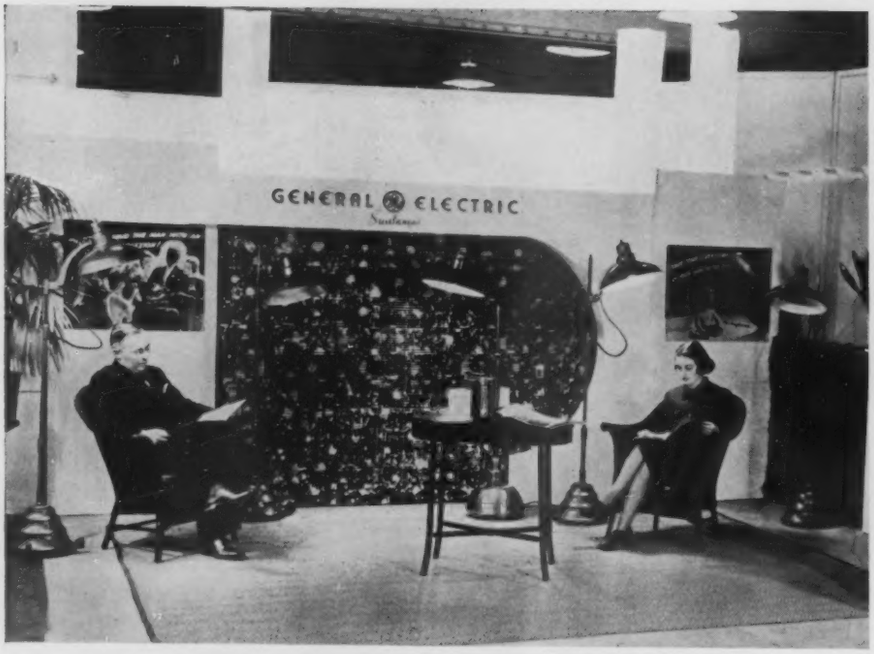


A SUN CORNER OR ROOM . .

● Even the modest little shop, as well as the big department store, can devote a corner to sun lamp display and demonstration with profit. It need not be elaborate, although the more atmosphere you give to it, the more attracting power it will possess. A comfortable chair, and a representative display of sun lamps and heat lamps, plus any summer or tropical display you can provide, gives you a place to take the prospect, demonstrate the lamp, explain its features, answer questions and close the order.

Promote

"The Health Room"

● Bath rooms can become "health rooms" when a dealer promotes and displays the possibilities of the idea. An attractive boudoir dressing table arrangement, with a sun lamp standing by, and an electric heater in the wall, can bring your prospects a welcome new thought in home design that will mean business for you.

● Style trends in home designs are not difficult to start. People are anxious for ideas that will set their new house apart from those of the past, something more modern, something to enhance the comfort and pride of ownership. With safe electric heat at the individual's control in the bath room, and a sun lamp to bring a healthy complexion, "you have something there!"

Sell All Health Appliances

●

● **SUNLAMP**

Best seller in the health line is the sun lamp. Dramatize it and it will make the nucleus of your health department.

● **HEAT LAMP**

For those who want a deep warmth to relieve pain, the infra-red lamps help to relieve congestion by stimulating the flow of blood. Make your health department a place from which all your customers may obtain such electrical aids to health.

● **ELECTRIC BLANKET**

Newest comfort and health bringer is the now perfected electric blanket. It has been made safe as well as convenient to use. For the large number of people whose circulation is poor or for convalescents this new low-voltage, heat controlled blanket is life's greatest boon. Light in weight, it gives warmth without tiring the sleeper from the load of heavy blankets usually needed in cold weather. A window display and a promotion should bring publicity and sales. Be prepared for a strong demand arising out of national advertising and publicity in the press.

● **HEATING PADS**

Staple merchandise every season is the electric heating pad. Now that Under-writers have established standards for these appliances you can sell them with more assurance. Style as well as usefulness enters into the choice. Manufacturers offer a variety of colors and finishes and accessories with which to satisfy your trade.

● **SHAVERS**

Best evidence of the popularity of electric shavers is the number of new makes on the market. A volume item at a good margin and stable price, the shaver can be the means of attracting traffic to your health department. Lead your prospects into the department to see and buy shavers. Expose them to your other health appliances.

● **OTHER HEALTH AIDS**

Beauty appliances, such as hair curlers, hair dryers, vibrators and even the electrically warmed rolling pins used in reducing are a natural adjunct to the health room idea. To these may be added the electric evaporators for inhalants, the electric water heaters of the small immersion type, razor blade sharpeners and other electric devices used either in health or beauty treatment about the home. By developing a department for such wares, especially during the winter months, you can attract a good portion of trade that now does not know where to find such equipment. Get customers accustomed to coming to your store to obtain everything electrical.

Station L Boiler Passes Sixty-Day Test

New Portland G. E. integral-furnace steam generator proves both fast and flexible

By RUSSELL F. MILLER
Portland General Electric Co.

PLACED in operation by the Portland General Electric Co. this August was an addition to its high-pressure boilers at Station L. The new unit is an integral-furnace steam generator rated at 225,000 lb. per hr. maximum, at 450 lb., 725 deg.

Installation of high-pressure equipment at Station L was begun in 1926 with a 200,000-lb.-per-hr. Stirling boiler and a 20,000-kw. turbine. A 300,000-lb.-per-hr. Stirling boiler and 35,000-kw. turbine were added in 1930. At that time, the low-pressure side of the plant consisted of nine 200-lb. boilers, capacities of which totalled 280,000 lb. per hr.; three low-pressure turbines, and one Corliss-engine-driven generator — a total generating capacity of 22,500 kw.

Thus by the end of 1930, installed generator capacity totalled 77,500 kw. However, to generate at this rate would have necessitated 950,000 lb. per hr. of steam, whereas the maximum total capacity of the boilers was but 780,000 lb. per hr.—500,000 lb. per hr. high pressure, 280,000 lb. per hr. low pressure.

The two high-pressure turbines used regenerative feed water heating. Hence, in order to realize full capacity on these units and take advantage of their lower rate, steam from low-pressure boilers was used for high-pressure feed water heating. Under this management, actual plant capacity was 62,500 kw., of which 55,000 kw. was generated by the two high-pressure machines.

NORTHWEST ASSOCIATION REPORT
To be presented at the 1938 meeting of the Production Committee, E. H. Collins, chairman, Engineering & Operation Section, Northwest Electric Light & Power Association.

In 1936, an increased demand for steam generation was partially met by increasing the maximum capacity of the 300,000-lb.-per-hr. Stirling boiler to 400,000 lb. per. hr. through installation of complete water walls in the combustion chamber* and through the addition of larger forced-draft fans.

It was the 1937 demand which necessitated provision for an additional 200,000 lb. per hr. of steam, the quantity needed to release full machine capacity.

After considering many types, the company decided to install a Babcock & Wilcox integral furnace boiler. Among the factors influencing the selection were:

1. Lower initial cost and tendency toward lower steam cost than those for the conventional four-drum boiler.
2. Convenient size, simplifying foundation and housing problems.
3. Low operating costs anticipated because of automatic controls, high efficiency expected, and low maintenance expected by reason of previous experience with the stud-tube, water-walled furnace.

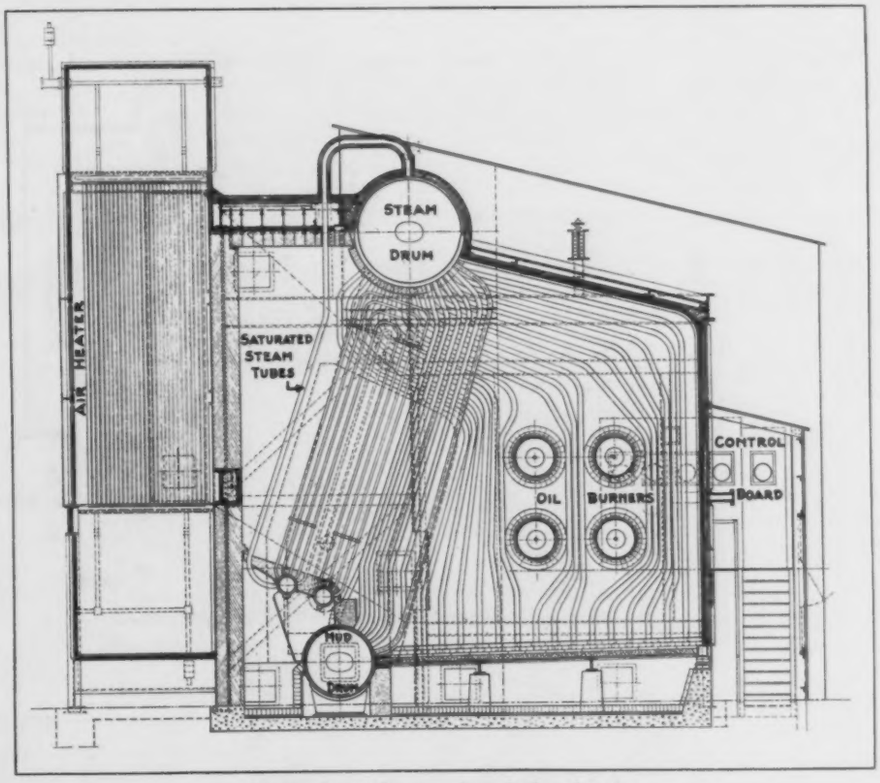


Fig. 1—Bent-tube, two-drum boiler elevation

The unit consists of a bent-tube, two-drum boiler (Fig. 1) with a loop-tube superheater behind the first pass. The two drums are all-welded. The upper, or steam

ENGINEERING

drum, is 66-in. diam., 35 ft. long; the lower is 41⅝-in. diam., 31 ft. 10 in. long. Boiler tubes are arranged in three passes (Fig. 2), gasses cross-flowing horizontally through the unit. Tubes in the first pass ahead of the superheater are 3¼-in. outside diam., the succeeding ones 2½-in. All have alternate wide and narrow spaces to facilitate renewal, and are so arranged that any tube in either boiler or furnace may be replaced without removing another. The water-cooled furnace tubes are connected to both boiler drums, thus forming a part of the boiler proper.

The furnace is completely water cooled, with Bailey stud tubes on the side and baffle walls, bare tubes on the burner and target walls. The floor is constructed of 3¼-in. tubes on 12-in. centers, covered with crushed refractory and two layers of refractory block. Four high-capacity oil burners fire parallel with the drums, atomizing mechanically at medium and high loads and by steam, if desired, at low loads or when the boiler is banked.

Composing the air heater are 2,296 plain, 2½-in. tubes. These allow two gas passes and four air passes, the gasses passing through the tubes. Air is forced through the heater by a Turbovane blower, rated at 60,000 cu. ft. per min. at 100 deg. against 13 in. of water. It is driven at 1,780 r.p.m. by a constant-speed motor.

Table I—Heating Surface
(Sq. Ft.)

Boiler	12,836
Water walls and floor	2,907
Superheater	2,825
Airheater	25,500

Table II—Water Analysis
Parts per Million

Total Solids	500
Soluble Phosphate	45
Sodium Sulfite	40
Sodium Sulphate	200
Sodium Hydroxide	50
Sodium Carbonate	35
P H Value 10.5	

Table III—Test Data

Steam output (lb. per hr.)	227,814
Temperatures (deg. F.)	
Superheated steam	741
Water to boiler	321
Furnace at burner level	2,585
Gases leaving boiler	775
Gases leaving air preheater	434
Air to air heater	70
Air from air heater	466
Pressures (lb. per sq. in. gage)	
Boiler drum	429.6
Superheater outlet	390.4
Feedwater to boiler	539
Air Pressures (In. of water)	
Blast box	plus 6.5
Draft (in. of water)	
Furnace	—0.27
Boiler outlet	—2.87
Preheater outlet	—5.40
Heavy California Fuel as Fired	
Gravity A. P. I.	12.6 deg.
Heating value per lb.	18,502 B.t.u.
Moisture and sediment	0.82%
Conradsen carbon residue	11.4 %
Gas Analysis at Boiler Outlet	
Carbon dioxide	15.18%
Oxygen	0.92%
Carbon monoxide	0.33%

Heating surface is distributed as shown in Table I. The 7,298-cu.-ft. volume has a heat release of 40,000 B.t.u. per cu. ft. when delivering steam at 227,000 lb. per hr.

Bailey full-automatic, air-operated combustion control is used and has proved highly successful. It correctly proportions fuel and air simultaneously with changes in steam demand, these changes being reflected by variations in steam pressure. Working well over a wide range of load variations, the control may be set to maintain any desired amount of excess air.

Feed water is regulated by a Bailey three-element control. This proportions feed-water flow to steam flow, subject to modification by any change in water level. During 24-hr. periods in which boiler loads have varied from 40,000 to 225,000 lb. per hr., recorder charts have shown the water level to vary by less than 1 in.

For boiler make-up, condensate is taken from the low-pressure system or from the high-pressure evaporators. Hence chemical conditioning is maintained principally to prevent corrosion, foaming and embrittlement, although phosphate is used in the boiler to prevent possible scale from condenser leakage to the feed water. Average analysis of boiler water is shown in Table II.

Fig. 2—Boiler plan

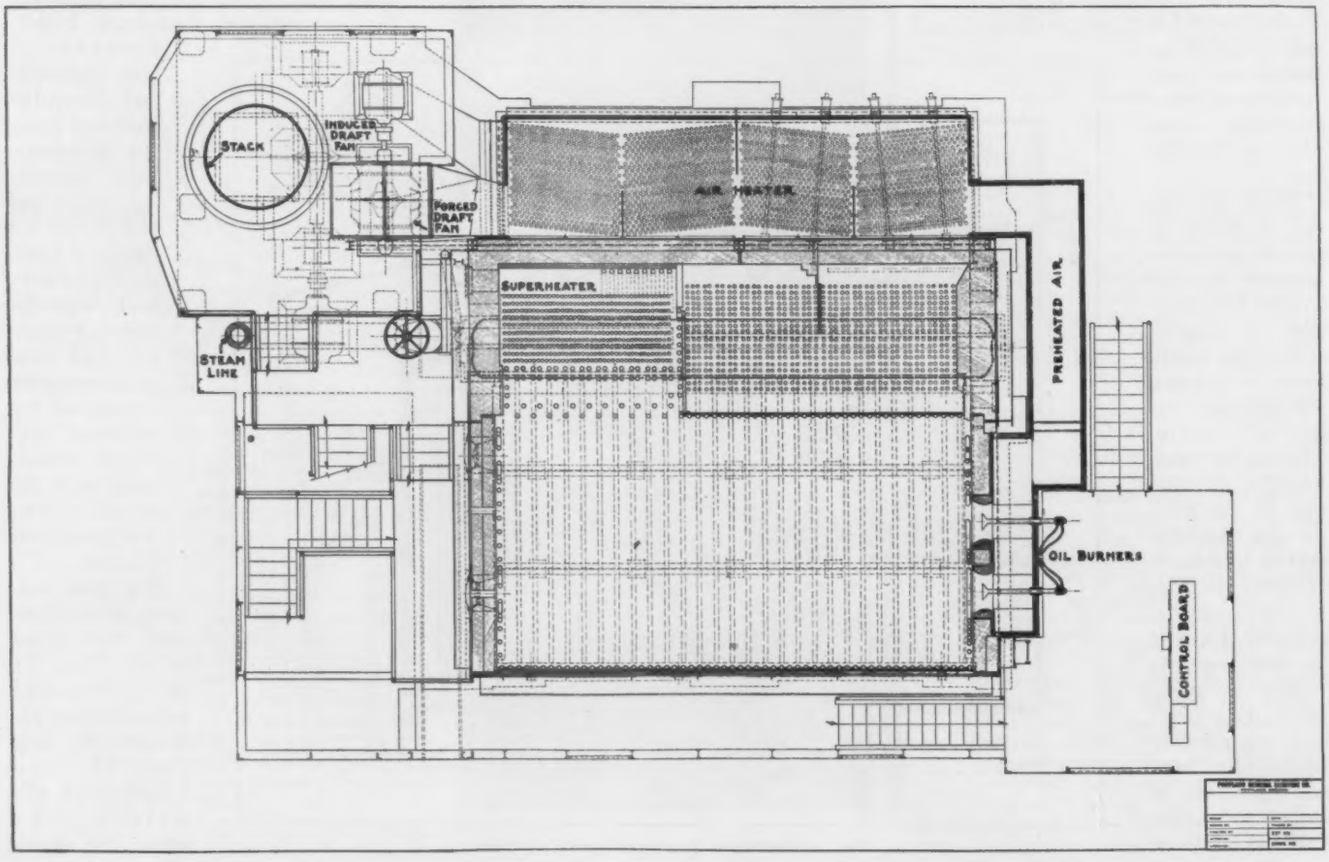
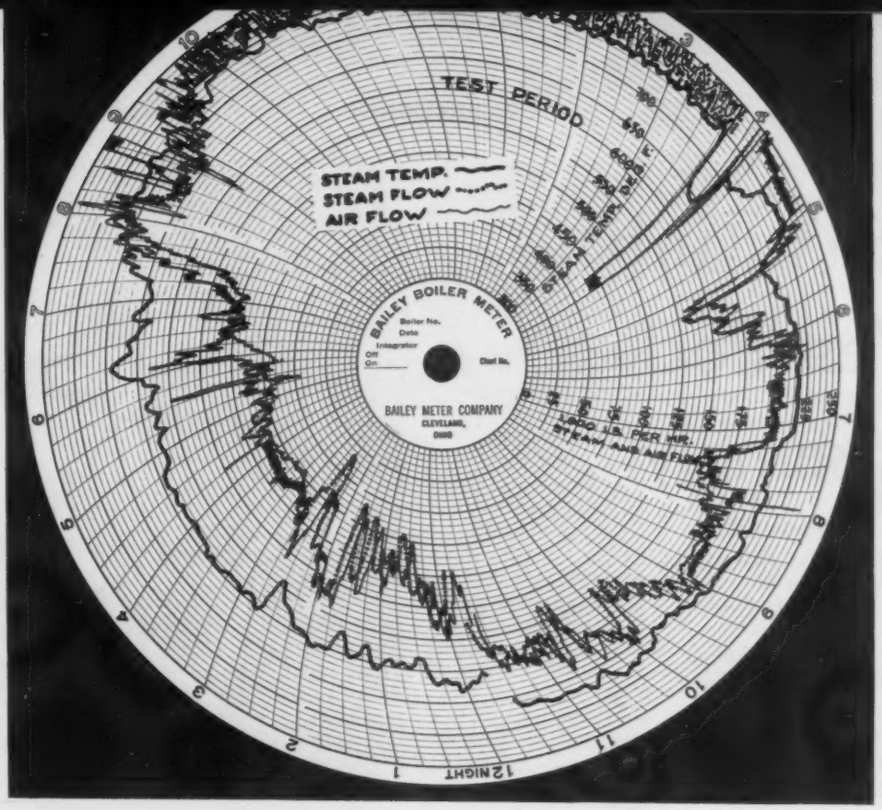


Fig. 3 →



Feedwater from the turbine condensers carries dissolved oxygen in amounts varying from 0 to 0.05 c.c per liter. This is absorbed in the boiler by sodium sulfite, of which but 0.6 lb. per 1,000,000 lb. of evaporation is required.

After the unit had been in operation a little over two weeks and the necessary adjustments made, a test was run to determine the overall performance at expected steam capacity. For test purposes the unit was isolated from other steam generating equipment and its total output fed to the 35,000-kw. turbine.

Table IV—Heat Balance

	B.t.u. per lb.	Per Cent
Heating value of fuel	18,502	100.0
Heat absorbed by steam generating unit	15,611	84.4
Heat loss due to moisture from fuel, air and combustion of hydrogen in fuel	1,050	5.7
Heat loss in sensible heat of dry flue gas	1,281	6.9
Heat loss in carbon monoxide	187	1.0
Heat loss in radiation, unburned hydrogen and hydrocarbons, burner steam and unaccounted for	373	2.0
	18,502	100.0

Although the rating is 225,000 lb. per hr., a load of 227,814 lb. per hr. was carried during the 3-hr. warm-up period and throughout the 4-hr. test. Load on the turbine was maintained at 22,000 kw., and steam bled from the third and eighth stages was used for feed-water heating. Fig. 3 is a chart taken during the test.

While the load carried was in excess of rated capacity, the overall efficiency (boiler, furnace and burners) was 84.4 per cent, corresponding with an actual evaporation of 14.3 lb. of steam per 1 lb. of oil.

At the end of the 4-hr. run, a test of the boiler's flexibility was made. A 17,000-kw. load was suddenly dropped from the turbine (reducing steam demand from 227,818 to 60,000 lb. per hr.) left off for 15 min., then suddenly picked up. Boiler pressure dropped 20 lb., returned to normal in about 10 min. The 22,000-kw. load was held constant. Operating conditions show that the boiler will pick up load just as fast as the turbine.

Installed outside the main boiler room, the unit occupies a 44x60-ft. ground space. Only the operating platform and fans are housed. Although most of the unit is steel encased, additional insulation was added over the furnace before application of the water proofing, which consists of a coat of asphalt emulsion mixed with sand and asbestos fiber. Cost was less than half that for a complete boiler house.

During the first sixty days of operation, the unit produced 275,000,000 lb. of steam without an outage. From present indications it should prove a very desirable addition to the company's steam generating equipment.

Automatic Speed Variation Simplifies Pump Drive

Simplicity, compactness and better operation have been obtained at the sewage treating plant at Huntington Beach through the use of variable speed driving units powered by constant speed induction motors. The unit built by Sterling Electric Motor Co. employs a V-belt drive of two sheaves arranged so that their effective diameters can be varied inversely and simultaneously. In this installation, the speed-changing mechanism is chain driven from a small single-phase motor, as shown in the accompanying photograph.

The units drive 6-in. centrifugal pumps having a capacity of 800 g.p.m. each. The speed varying mechanism is actuated by means of a float and an extension rod, the float being installed in the wet well.

To the left of each pump is the float extension rod, actuating control to small motor at top left. Beneath this is the chain drive to variable sheaves

Raw sewage is deposited in the wet well and pumped into a specially constructed sedimentation tank for treatment. Because the rate of flow varies from a minimum of 50 per cent of average to a peak of five times average, the automatic speed control features of the pumping installation eliminate the need for various size pumping units heretofore thought necessary to meet the varying flow of sewage plant installations. A minimum of attendance is required as the plant functions practically automatically.

Tucson's Turbine A Vest-Pocket Assembly

By J. H. SAUNDERS

Superintendent of Power Production
Tucson Gas, Electric Light & Power Co.

INSTALLATION of a 6,250-kva. steam generating unit by the Tucson Gas & Electric Co. this summer is significant not only because it contributes another chapter to the record of constantly improving central station design, but also because it terminates a series of diesel installations which extended over twenty-two years.

Installation of diesels at Tucson began in 1915, when the plant consisted of four steam engines totaling 1,325 hp. Since then other diesels have been added as shown in Table I.

Since the last one was installed in 1932, load in the City of Tucson, and regions to the north and south, which comprise the company's service area, have increased 16 per cent per year. The load is served from the one generating plant located within the city. In reaching a decision as to what type of generating equipment should be installed to accommodate this growing load, the company was guided largely by the limitations of available space.

A high-pressure turbo-generator with outside boiler was found to offer a desirable solution as this could be installed without any additions to the existing building and without removing any of the diesel engines.

The unit consists of turbine direct connected to a 6,250-kva., 80-per-cent p.f., 3-phase, 60-cycle, 4,150-volt alternator. An exciter is direct connected to the alternator through a flexible coupling.

As it was desirable to install the new unit on an old Corliss engine foundation, considerable ingenuity of design and arrangement was necessary. The turbine was provided with a side outlet exhaust and the centerline of the condenser is only slightly lower than that of the turbine. As shown in Fig. 2, the air removal pumps and the four vertical heaters are located between the turbine and condenser while the two boiler feed pumps are located immediately outside of the condenser. The condenser hotwell and condensate pump are located in the flywheel pit of the old foundation. The surface type alternator air coolers are built into the alternator frame, thus eliminating all air ducts below the operating floor line.

TABLE I

Diesel	Kva. Rating	Installed
Fulton	375	1915
Fulton	375	1916
Busch	500	1919
Busch	500	1921
Werkspoor	925	1923
Werkspoor	925	1925
Busch	3750	1928
Busch	3750	1929
Busch	3750	1932

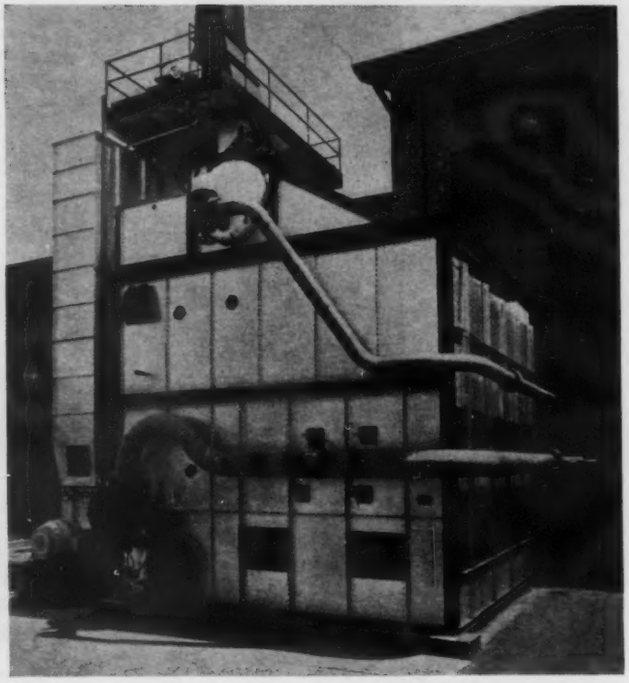


Fig. 1

Usually it is necessary to provide space at the exciter end of the unit for removing the alternator rotor. The Tucson unit was the first installation in which the alternator frame is designed for tilting so that the rotor may be removed over the turbine. One step in removing the rotor in this manner is shown in Fig. 5. Here the rotor has been jacked forward until the center of gravity is outside the alternator frame. A hitch is being taken on the rotor which will permit further removal with the crane.

The boiler, a Babcock & Wilcox, is outdoor, sheet-metal covered, carrying

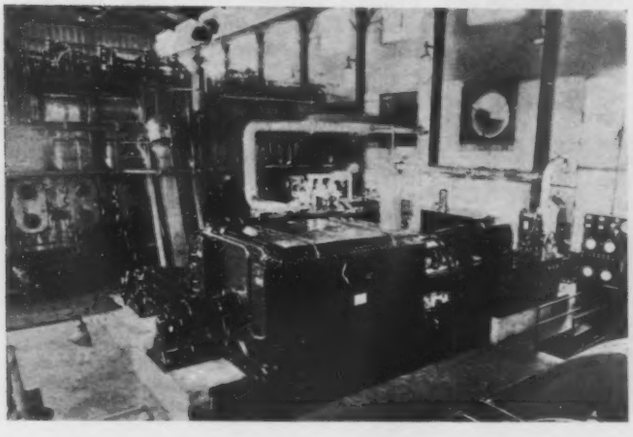


Fig. 3. 6,250-kva. turbo-alternator in foreground; 3,750-kva. diesel at rear

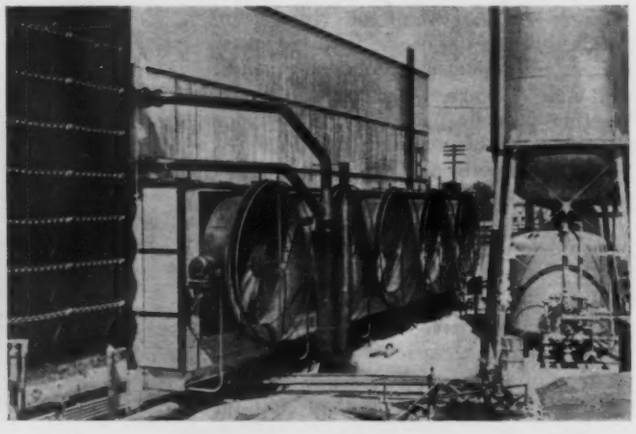


Fig. 4

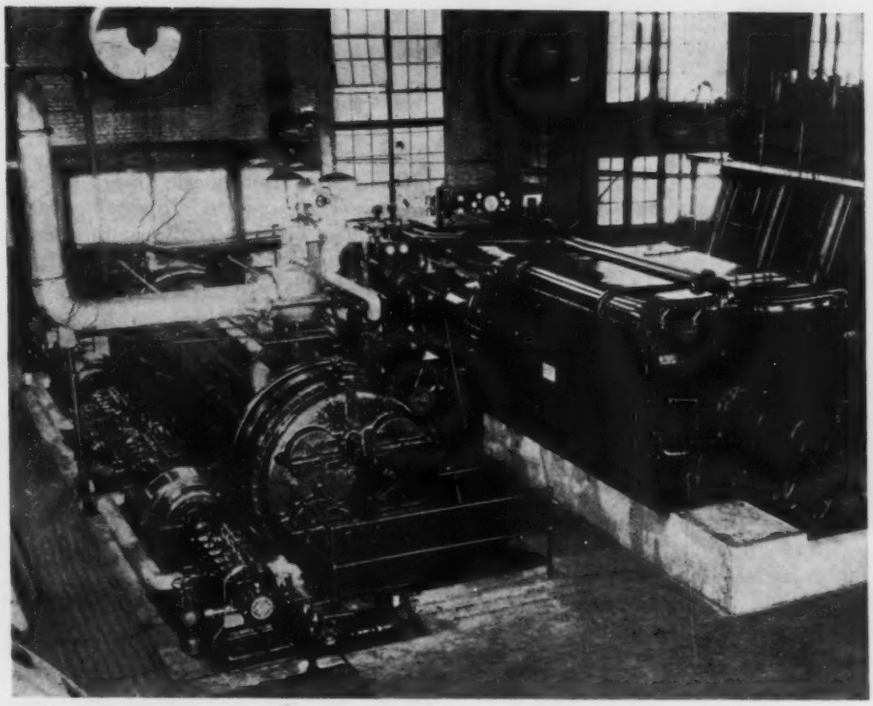


Fig. 2. From left to right: feed pumps, condenser, heaters and air removal pumps, and the turbine. The boiler is outside the wall at rear

an integral type furnace with capacity of 75,000 lb. of steam per hr., at 875 lb. gage, 825 deg. F. Heating surface is 6,501 sq. ft. The superheater is a loop tube type, designed to give constant temperature over a wide variation of steam flow. The steam drum is fusion welded, 42 in. in diameter and 3¼ in. thick at the tube holes. There is also a 36-in. diameter mud drum. All steel is open-hearth, 70,000-lb. Furnace volume is 2,855 cu. ft.

Draft Equipment

The fuel and air mixture is automatically controlled by a Bailey air flow-gas flow ratio meter. It is equipped with an automatic forced draft damper control, the fire being regulated by the induced draft damper. Air going to the boiler passes through a counter flow air preheater and leaves the heater at about 400 deg. F. and enters furnace through four Babcock & Wilcox "San Diego" gas burners. The boiler has three horizontal passes. The flue gas leaves the bottom of the boiler at approximately 630 deg. F. and leaves the air preheater at about 350 deg. F. through a Thermix induced-draft stack.

The forced-draft fan is a Clarage Type RT with a 75-hp., 1,165-r.p.m motor on one end and a 40-hp., 865-r.p.m. motor on the other with a maximum capacity of 24,000 cu. ft. per minute. The change from low to high speed and vice versa is automatic.

The induced draft fan has a capacity of 31,200 cu. ft. per minute and is driven by a 75-hp., 1,165-r.p.m motor on one end of the shaft and a 40-hp., 865-r.p.m. motor on the other. The change of speed is manual.

The cooler for the alternator is a closed type Griscom-Russell surface heat exchanger. The cooling medium is taken from the condenser circulating water supply.

Turbine Proper

The turbine is an Allis-Chalmers impulse reaction tvpe, 3,600-r.p.m., 6,250-kva., 4,150/2,400-volt unit, designed to operate at 825 lb., 825 deg. F. It has four bleed stages, and the side outlet exhausts to a surface condenser at 2-in. Hg. back pressure. The over-all dimensions of the turbine are 32 ft. long by 10 ft. wide by 8 ft. high. It has a direct connected gear lubricating oil pump with an automatic steam pump to operate in case of failure and in starting.

The turbine consists of a single Curtis stage followed by reaction blading most of which is on a conical drum. All of the rotating blading is set directly in grooves in the solid turbine rotor. The balance piston and the impulse wheel are made integral with the rotor body.

Interesting is the design used to keep the cylinder symmetrical and facilitate manufacture. The carbon vanadium alloy steel section of the cylinder is carried down within four rows of the turbine exhaust. Four extraction nozzles are provided in the lower half of the cylinder for uncontrolled extraction for feedwater heating; one extraction point following the impulse stage and three extraction points along the reaction portion of the blading. As these three lower pressure extraction nozzles are all located in the steel section of the turbine cylinder, a large steam belt is provided at each nozzle by welded-in blade carrying rings. A similar ring is used to carry the labyrinth packing for the balance piston. This design aims to eliminate complicated coreing and

Fig. 5

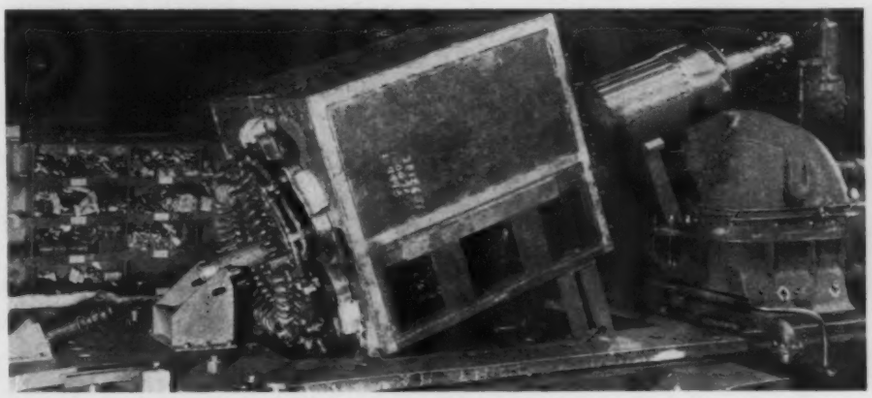
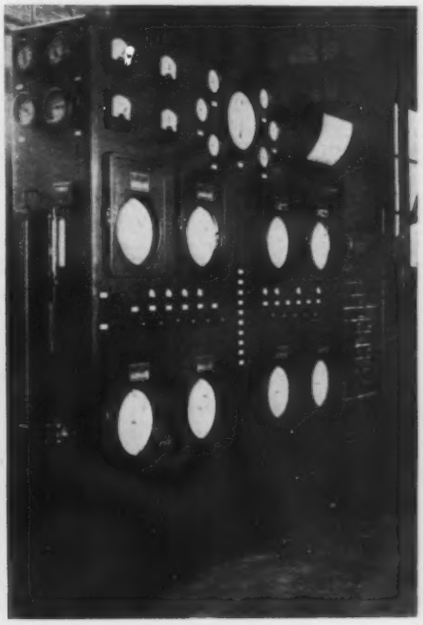


Fig. 6



permit thorough inspection of cylinder castings.

Of unusual design is the turbine steam gear which assembles the steam strainer, high-pressure throttle valve, six steam control valves and low-pressure throttle valve in one unit mounted on a separate baseplate.

The Condenser

The condenser is of the two-pass type, having 5,400 sq. ft. of cooling surface contained in the steel shell, 72-in. diam. by 19 ft. long. The tubes are of Admiralty metal 1-in. diam., No. 18 BWG. It was selected to maintain 28-in. vacuum under full load conditions when supplied with 7,200 g.p.m. of 80-deg. F. cooling water.

Steam is led into the condenser through an inlet nozzle located on the side of the shell, which is bolted directly to the turbine exhaust nozzle, the condenser being mounted on flexible columns to allow for movement with changes in temperatures.

Air removal equipment is of the twin, two-stage type with one-half of the twin unit being proportioned to remove the air and non-condensible vapors during normal operation and the other side a spare. Separate surface type inter and after coolers are provided to insure against leakage between stages and provide uninterrupted operation.

The side outlet exhaust created a number of problems on the hot well level control. The Swarthout floats operate, through a hydraulic medium, the automatic valves which control the water level within an 8-in. limit. In case of failure of the automatic valves, or the regular condensate pumps, a third condensate pump automatically comes into service before the water level reaches a danger point on the turbine exhaust.

To assure a constant boiler feed an automatic valve, operating from a high level tank, admits water to the suction of the boiler feed pumps in case of failure of the condensate pumps.

There are two 200-hp. motor driven boiler feed pumps, 3,560 r.p.m., 2,310 ft. total head and 150 g.p.m. The pumps are eight stages, four stages on each side of the motor. Temperature of the water leaving the boiler feed pumps is less than 150 deg. F.

There are four Griscom-Russell surface type heaters grouped in pairs, automatic valves by-passing two units at a time. The maximum boiler feed temperature is 425 deg. F.

The boiler water level control is a Bailey fluid type, operating on a diaphragm motor valve, following a constant pressure regulating valve.

Water Supply

The boiler is supplied from a well with a water hardness of 15 grains per gal. The water is first treated through a Lakeside Zeolite softener and goes through a Griscom-Russell evaporator, the vapor being condensed in the first stage bleed heater. Any excess makeup is by-passed automatically to a high-level condensate reservoir. The steam input to the evaporator is controlled by the level of the water in the elevated tank.

The cooling tower (Fig. 4) is a Marley forced draft with five 20-hp., two-speed fans, each running a maximum capacity of 9,000 cu. ft. of air per min. Water capacity of the tower is 5,000 g.p.m. This unit is 26 ft. wide by 70 ft. long by 30 ft. high. It has two horizontal water spray headers. Excess water not taken care of by this tower is used to cool the diesel engines and this water is circulated over a Braun 3,000-g.p.m. atmospheric tower. In case no diesel engines are in operation 3,000 g.p.m. can be circulated over the Braun tower without going through the engine jacket. This gives a net cooling capacity of 8,000 g.p.m.

The circulating water make-up comes from the softener and is treated for algae by the addition of free chlorine. This chlorine dispenser is furnished by Wallace and Tiernan Co.

Control

A single operator, stationed at a central control, handles the boiler and turbine unit panel, furnished by General Electric Co., which is equipped with Bailey meters and Ashcroft gages. All of the auxiliaries and turbine output can be controlled by the remote control switch mounted on this panel. Ammeters and pilot lights indicate auxiliaries in operation (Fig. 6).

The main contact switches are General Electric air break, 440-volt type and all auxiliaries can be energized from either the turbine auxiliary transformer or from the house auxiliary bank through mechanically interlocked switches controlled on the main control board.

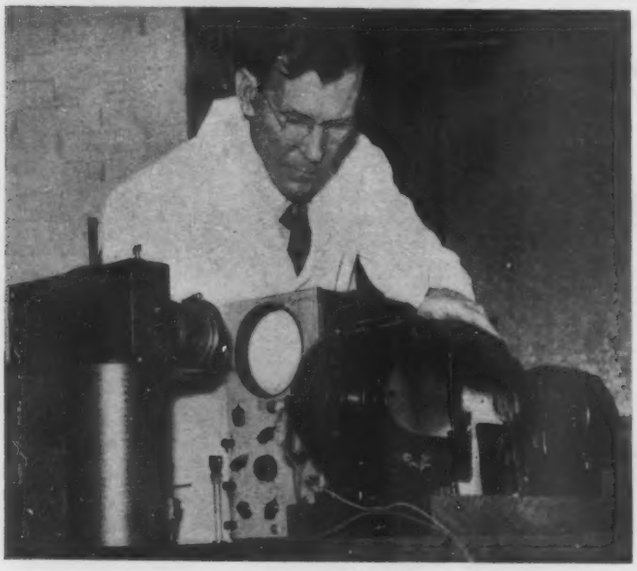
The synchronizing is done by the operator of the main switchboard. It has a dual control in conjunction with the turbine control board. The main generator switch is supplied by General Electric and is interlocked electrically through the direct connected exciter and an auxiliary house exciter.

There is a current differential protection on each phase of the generator interlocked with the exciter and main circuit breaker switches. It automatically unloads the machine in case of a ground within the unit.

Summary

In operation since early summer, the unit has performed well. Exceptionally good balance plus complete enclosure of the machine have made for quiet operation, an important factor, since the plant is located in a residential area. Operating data are being accumulated but are not as yet conclusive enough to afford a comprehensive comparison between diesel and steam economies on units of this size. However, in Fig. 3, in which the 6,250-kva. steam unit and a 3,750-kva. diesel appear, is evidence of the space economy, already referred to as a leading factor in the choice of steam.

Machine Boasts Memory Plus Concentration



Devised by Westinghouse, this machine delays the oscillographic record of an event by 2 cycles (1/30 sec.). Each of 147 commutator bars is connected to a .01-mf. capacitor. Bars are charged in turn from a brush energized by the variable under observation. After carrying the charge through nearly a revolution, they discharge to the oscillograph through another brush. Thus time is allowed for relays and camera shutter. Instance: the device lies in wait for rectifier arc-back, which may occur but once in 1,728,000 cycles (8 hours)

Condenser Performance

Reported by R.M.E.L.

By R. T. ARMSTRONG
Superintendent of Power Production
The Trinidad Electric Transmission, Railway & Gas Co.
Trinidad, Colo.

THAT the steam condenser is a piece of equipment which can be made to give exceptionally satisfactory service is the conclusion drawn from the reports of ten companies in the Rocky Mountain region. Submitted by these companies are statements of the type of equipment operated together with complete reports of troubles, their causes and their remedies.

Nine companies reported on surface condensers and one on a jet condenser. Of the nine installations, four were Westinghouse, four Worthington, and one Ross; seven were two-pass, two were single-pass.

Sizes vary from 1,220 to 30,000 sq. ft. of condenser surface, and age from one to thirteen years of service.

Of the surface type, four units had the tubes packed on one end and rolled on the other. One condenser had the tubes rolled in both ends, and six had the tubes packed at both ends.

Predominating trend seemed to be toward the use of Admiralty metal in the tubes. The use of Muntz metal was reported by but one operator.

There were found to be only three installations for the detection of leakage of the circulating water into the condensate.

Tube failures were reported by three operators. Two were due to dezinctification trouble, the third to tube vibration arising through poor tube baffle design.

Reports on treatment of circulating water showed that one operator was taking steps to prevent Algae accumulation, that four were using zeolite and prosphate treatments for scale. Except in one case, in which large quantities of river sand had a scouring effect on the tubes, all operators reported periodic cleaning, the interval varying from a one year maximum to a minimum in one case of every thirty days.

These three methods of cleaning were reported to be in about equal favor:

1. Boiling muriatic acid and wire brushing.
2. Mechanical drills.
3. Shooting with rubber plugs.

It seemed to be the opinion of all operators that tubes should be inspected for outside film, and some attempt made to remove it.

Use of courset-lace packing was reported by half the group, while the other half was divided about equally between the use of fiber and metallic packing. Two companies had experienced trouble through improper installation of metallic packing. One reported the re-ending of tubes, damaged in operation or shipment, by brazing with an acetylene torch.

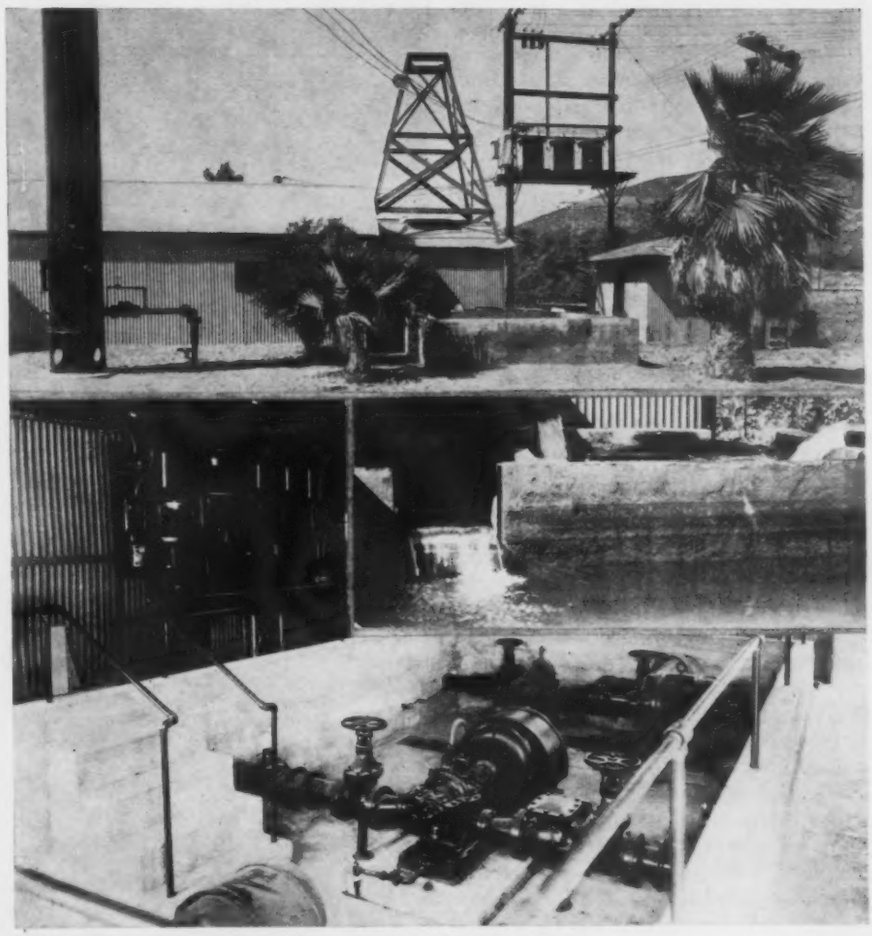
No tube creepage was reported on tubes packed at both ends, and the condenser with tubes rolled in both ends likewise was reported to be giving satisfactory service.

Construction in general seemed to be satisfactory. Only exception was the report of a warped tube sheet, believed due to improper fabrication, but most operators expressed the opinion that some advantage would be gained by making water boxes slightly deeper.

Seven operators reported men in their organizations who were sufficiently skilled to make all necessary condenser repairs.

No other difficulties were reported. None had had experience with the operation of, or repairs to, leaky condensers while in service. Average operating factor for the units reported ran well above 90 per cent.

New Electric Pumping Plant Installed



Obsolete was the word for the old gas-driven pumping plant at Elsinore, Calif. But the word applies no longer since Consulting Engineers Austin Burt and L. C. Faye of Ontario made their survey, Nevada-California Electric Corp. installed automatic electric equipment. Now the plant, pictured above—at top, general view; middle, water box; bottom, motor installations—, can pump not 500 gal. but 1,000 gal. per minute. Total installation, including water and sewer plant, consists of 250-hp. in electric motors. Notable feature is the use of high-speed booster pumps, 3,600 r.p.m., giving efficiencies of 79.3 per cent on the 30-hp. motor, 80.5 per cent on the 60-hp. motor. Improvements consisted chiefly in rebowling two well pumps, equipping them with direct-connected, automatically controlled electric motors; purchase of new direct-connected booster pumps to both the high and low reservoir, and installatoin of a 75-hp. direct-connected fire pump.

Electric Heating Applied to Industry

Electricity for industrial heating has one disadvantage—it costs more per unit of heat. Otherwise, users can be sure of many benefits —oftentimes such great benefits that plant equipment is paid for in one or two years

By ELMER J. CIPPERLY
Industrial Heating Specialist
General Electric Co.
Los Angeles, Calif.

WHAT are the disadvantages of electricity for industrial heating? One and only one—higher cost per unit of heat in most localities than solid, liquid and gaseous fuels. The bearing of thermal unit cost on overall cost varies widely with the product and the location of the heating device in the factory. On some low-grade products, the thermal unit cost may be the controlling factor, while on higher quality products, it may be negligible. However, in all cost studies, the cost of heat in the manufacture of most products represents a very small part, usually less than one per cent of the cost of the finished product.

The story of the electric light and power industry, and of other industries that have played a major part in the progress of civilization, might well be set up as a series of developments. And it is interesting to note that in passing from one stage to the next *the cost item has not been a vital factor.*

This is well illustrated by the fact that in replacing the horse with the automobile, horse cars with the modern street railway system, kerosene lamps with the electric light, etc., there has been a material increase in cost in each instance. Nevertheless, improved processes and superior mechanical devices have found, and will continue to find, warm welcome awaiting them simply because the advantages and conveniences which attend their adoption easily overbalance the cost factor on the scales of commerce and industry.

The introduction of electric heat has set up new standards of comparison in industrial production and has been responsible for actual operating results that have hitherto been considered impossible. It is likely, indeed, that when the story of electric heat has been completely unfolded, it will parallel closely that of the electric motor, which, when introduced to industry as an economical and reliable source of mechanical power, bumped squarely into industrial traditions, intrenched behind barbed wire barriers of generations of antiquated shop practice. *The electric motor came into its own because its advantages were so obvious that industry demanded it.* Once placed, it acted as a superior salesman for more of its kind. The electrically operated heating equipment is making its place in very much the same manner.

There is hardly an article of commerce today that is not subject at some stage in its production to heat treatment. Practically every shop, factory and industrial plant is a prospective user for heating apparatus; and each day brings to light some new operation where the application of electric heat will prove advantageous.

Economies

1. Lower maintenance,
2. Better quality product,
3. Increased production through shorter heating cycle,
4. More uniform products through heat regulation,
5. Fewer rejections,
6. Definite heat treating data can be obtained,
7. Repetition of results,
8. Improved working conditions,
9. Lower insurance rates (elimination of fire hazard),
10. Lower accident rates,
11. Better plant arrangement and saving of floor space.

Improved Efficiencies

1. From labor,
2. From materials,
3. From apparatus,
4. Less heat loss,
5. Better power factor,
6. Some processes cannot be successfully done with other forms of heat.

It is apparent that when the above items are taken into consideration the comparative costs of fuel are merely incidental and should not be used as the sole basis of comparing electricity with other forms of energy. Definite examples indicate that these advantages are actual and result in an appreciable saving in overall cost of production.

Heating equipment consists of:

The midget heating units,

Water immersion heating units,

Oil immersion heating units,

Oil temperature bath heating units,

Alkaline bath immersion heaters,

Nickel and copper electro-plating bath heating units,

Lead sheath heating units for direct immersion in mild sulphuric acid baths,

Cartridge heating units,

Strip heaters of all sizes and kinds,

Cast-in Calrod heating units, made by casting molten iron around Calrod units, making a cast iron heating unit of the size and kind required, such as are used to immerse directly in lead pots, babbitt pots, stereotype pots and the like;

Straight lengths of Calrod for any size job, such as those used to thaw the ice from the nose of the huge dam gates of the nation's waterways so that they can be operated throughout the winter; and the application of these units in frogs and switches on main lines of the nation's steam railroads assuring free operation by keeping the snow and ice thoroughly thawed from the parts during the winter season;

Fin type Calrod—the answer to the application of electric heat for air-conditioning equipment;

Air heaters for shop offices, crane cabs;

Forced convection type of air heaters using aphonic pressure type fans and fin Calrod heaters, all mounted in a housing for portable use and for ceiling mounting;

Oven heating units for industrial ovens;

Lead and babbitt pots;

Portable solder pots for the work bench, complete line of "cast in" metal immersion heating units for babbitt or all soft metal melting to 950 deg. F.;

Glue pots, jacketless, water jacketed and with complete automatic temperature control;

Soldering iron, light duty, intermediate duty, heavy duty;

Thermostats—all ranges, all sizes;

* Presented before the Electrical Maintenance Engineers Assn. of Southern California, Oct. 19, 1937.

Metallic resistor furnaces to operate to 1,850 deg. F. All sizes from 9 in. inside to 18 ft. inside, from 11 kw. to 1,800 kw.;

Industrial ovens—for baking finishes on metal doors, metal furniture, paint on refrigerators, baking cores in foundries;

Impregnation tanks for cold tar enamel, tar, used in coating piping;

Melting furnaces for steel, cast iron, brass;

Electric resistor furnaces for the bright annealing of copper wire, automobile body steel, using artificial atmosphere to produce bright finish scale;

Copper Brazing—furnaces, where two or more parts are joined by use of copper and hydrogen as a flux;

Scale free hardening furnaces—furnaces that produce steel parts heated to 1,650 deg. F., quenched and that come through with bright finishes.

Benefit to Users

When electric heat is supplied in manufacturing processes, tangible results are realized by the user in increased production, uniform and improved quality of product, lower maintenance expense, improved working conditions, and frequently lower overall costs. In many cases the use of electric heat pays handsome returns on the investment. Many instances are reported where these savings pay for the entire equipment in one or two years, or even less.

For example, a large steel company reports a saving of 44 per cent in heat-treating costs of alloyed bar stock, and adds that its battery of electric furnaces, thus operating, gives it for the first time "large volume production of heat-treated alloyed bar stock of laboratory accuracy in uniformity."

The potentialities of scale-free hardening furnaces are tremendous. A manufacturer of delicate electric instruments spent $15,000 for an electric furnace to replace a fuel-fired furnace, because the scaly surfaces of the heat-treated parts thus produced required removal by sand blasting. Gone is the scale, and gone is the sand, and the resulting saving is $15,000 annually.

With so many benefits to the user, it is of mutual interest to promote and greatly increase the use of electric heat in industry.

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"THE FACT MANUAL of Standard Electrical Porcelain" is available in a second edition revised to illustrate the 1937 national electric code revisions. Included are the wall chart and the newly developed all-porcelain outlet, switch and receptacle boxes. Copies are available through the Standard Electrical Porcelain Manufacturers.

Christmas Party Planned By Maintenance Engineers

Combined Christmas party and Ladies Night will be the next meeting of the Electrical Maintenance Engineers Association of Southern California, Dec. 14, at the Elks Club, Los Angeles. A turkey dinner, dancing until midnight, electrical prizes for the ladies, plus a display of all makes of electric ranges and water heaters will comprise the attractions of the occasion. Tickets are being sold by committeemen and at the Electrical Development League headquarters.

January's meeting on the 18th will deal with oils and greases. "Electrification of the Oil Industry" will be the main subject, and a moving picture, "How to Grease Ball Bearings", will be shown.

A trip to Boulder Dam is being planned for Feb. 12 and 13, the overnight tour to be handled on an excursion basis.

Contractor Maintainers

Ross Bartlett and J. O. Case, of Quality Electric Co., are often found in the Los Angeles industrial district where their organization does maintenance for a number of factories

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Electron Tube Course Begins in January

Interest in electron tube control of plant equipment has been so keen that a six weeks course in applications of such tubes to industry is scheduled by the Electrical Maintenance Engineers Association of Southern California, beginning Jan. 10, 1938. Seventy maintenance men signed for such a course after the last meeting of the E.M.E.A., Nov. 19.

E. W. Morris, engineer, Westinghouse Electric & Manufacturing Co., was the speaker at the Nov. 19 meeting. He followed up a previous session which dealt with the principles of electron tubes with an illustrated talk on "The Application of Electronic Tubes". General Electric Co. furnished a motion picture, "Excursions in Science", which illustrated applications of electric phototubes to industrial uses.

Attendance numbered 181, and it was announced that membership had now reached 326. A goal of 500 is set for the first of the year.

●

Question on Finding Wire Size Answered

Q—Can you give me a method for finding the size wire necessary for the feeders in a 3-phase, 4-wire system of distribution?

To find the size of feeder to be used for 3-phase, 4-wire distribution, when the feeder is to supply current for combination lighting and heating loads, proceed as follows.

First find the current:

$$I = \frac{P}{3E}$$ where,

I = current in amperes

E = volts between each phase line

P = power in watts

Having found I, the circular-mil area of the wire is determined as follows:

$$CM = \frac{1.73\,KLI}{D}$$ where,

CM = area of the wire in circ. mils

K = resistance of one mil-ft. of the wire*

L = length of the circuit one way in feet

D = allowable volts drop (usually not over 3 per cent)

On a balanced load, the neutral carries no current, and in no case will it carry more than that in any one leg.

As an example, suppose we wish to find the wire size necessary to supply a 3-phase, 4-wire system when the total load is 10-kw. at 120 volts, distance being 300 ft. By the above formulas:

$$I = \frac{P}{3E} = \frac{10{,}000}{3\times 208} = 16 \text{ amp.}$$

$$CM = \frac{1.73\,KLI}{D}$$

$$= \frac{1.73\times 11\times 300\times 16}{6.2} = 14{,}700$$

And the nearest BS wire size will be No. 8.

* For copper on a.c. circuits K is usually taken to be 11.

Electric fences do a good job at holding hogs inside a field, but they must be properly tested and engineered if they are to prove safe for either stock or humans

Electric Fences Save Money But Increase Deaths

By FRANK A. SHORT
Engineer, California Industrial Accident Commission

THERE is a growing tendency to electrify wire fences or strands of barbed wire for the purpose of keeping stock in or intruders out.

While it is much cheaper to surround a given area with one or more strands of barbed wire attached to insulators on wooden posts or stakes than to surround it with a substantial fence, it is a dangerous practice. Even though the current may be limited to a small value it may cause death to the cow or pig or other animal that comes in contact with it, and, in a number of cases, it has electrocuted human beings.

It is probably impossible to determine just how much current it takes to kill a human being under the circumstances which may exist at the time and place at which some child or grown-up comes into contact with an electrified fence; also, the resistance of the human body varies widely in different individuals and under different conditions. Those who have conducted experiments over a period of years to determine the effect of electric shock on the human body have found a very wide variation in the resistance of the body. It is thought by some authorities on this subject that the resistance of the body is not a true resistance, but is more like a voltage drop through the skin at the point of contact, and that this drop is practically the same regardless of the area of skin surface in contact with the electric circuit and regardless of the applied voltage.

When a person comes into accidental contact with an electrified barbed wire fence, it is quite likely that one or more of the barbs will puncture the skin and enter the flesh, so that there will be skin resistance at one contact only; this will lower the resistance through the body. During wet weather, and in locations where wet conditions exist, the shock hazard is increased. A number of fatal accidents on electric fences has been reported from other states. In California a small boy and a woman have been electrocuted on such fences, and several pigs and several head of cattle have been killed.

In California the Industrial Accident Commission has ruled that electric fences, like any other electrical equipment or apparatus must bear the Underwriters' Laboratories, Inc., approval or that of some similarly recognized testing group before it will be acceptable to the commission.

In Oregon the Bureau of Labor has issued specifications covering voltage, current, transformers, controllers and the entire fence assembly. In addition formal approval is required either by U.L. or other recognized testing authorities. Several makes of equipment have been submitted for testing the work being done by the Agricultural Engineering Research Foundation at Oregon State College.

The accident about to be described in this article was caused by a current so small that it seems incredible that it could have caused death and the terrible burns which occurred.

After breakfast one morning, the housekeeper on a small ranch took some table scraps out to the pigs. The owner of this ranch, instead of fencing in his pigs in the usual manner, had strung a barbed wire a few inches above the ground on insulators attached to stakes driven into the ground, and had electrified the barbed wire by means of a small radio "B-power" transformer.

After feeding the scraps to the pigs, the woman stepped over the barbed wire with her left foot but the right foot caught under the wire, causing her to fall in such manner that the back of her neck came into contact with a wire fence which was grounded. She was electrocuted, and, when found some time later, both ankles were terribly burned where they were in contact with the barbed wire.

A test made after the accident indicated no voltage between the electrified barbed wire and the surface of the dry ground where the woman was found, but showed 236 volts between the barbed wire and the wire fence with which the victim's neck came into contact. A test of the transformers showed no contact between the primary and the secondary coils and no contact between either coil and the iron core.

It is impossible to determine definitely the value of the current which caused this accident, but neglecting the ground resistence, which was quite high, and taking a value of one-fourth that usually found for the resistance of a body with dry skin, and then taking one-half of that value (because only one contact was made through the skin) we may assume that the resistance was not less than 12,500 ohms. On test, the transformer involved in this accident passed approximately 21 milliamp. through a resistance of 11,540 ohms, and passed only .78 of an amp. on short circuit. It may be assumed, therefore, that the current which caused this accident was in the neighborhood of 20 milliamp.

To prevent the possibility of fatal accidents to persons, such as the one described is this article, and to prevent the loss of live stock due to contacting electrified fences, the use of such fences

URAL LOADBUILDING

should be discontinued until such time as further tests and research have been conducted to determine a safe value of current to be used, and the proper length of time that the potential should be applied to the fence without being interrupted. The question: What is a safe value of current and what is the minimum value which will be effective to prevent live stock from going under, over, or through an electrified wire? is one which should be given a great deal of thought.

The principal reason for installing and using an electric fence is its saving in cost over the usual type of fence built strong and high enough to meet farm requirements. Since this saving in dollars is likely to be secured at the appalling cost of a human life, it is unbelievable that anyone who knows of the hazards of the electric fence would be willing to take such chances for the saving of many dollars.

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UPTODATE INFORMATION on various phases of rural electrification is to be included in a new rural sales handbook which is being prepared by a special committee headed by J. P. McElroy of the San Joaquin Light & Power Corp. Mr. McElroy, as editor-in-chief of the handbook will welcome the receipt of data on rural electric applications from manufacturers or distributors for possible inclusion in the handbook.

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Electricity Supplies Wintry Cities With Flowers

When the winter cold has killed off outside flowers in other parts of the country or put them beyond the reach of the average purse, one often finds gracing the tables of eastern city dwellers bunches of stiff, bright-petaled little flowers — California "Everlastings" or "Strawflowers." These gay little blossoms, *Helichrysum*, have been dehydrated in such a way as to retain their natural form and color, yet last for years.

The sale of these dried flowers is an important part of California's huge cut-flower business, the Montara and Pescadero districts supplying most of them to the rest of the country.

One of the largest growers of strawflowers in the Bay region is A. R. Wagner of the South Canyon Nursery, Montara, who this year raised fifteen acres of strawflowers and dehydrated 5,000,000 blossoms. Mr. Wagner uses electricity entirely, finding it the most satisfactory method.

His nursery has five dehydration chambers with a capacity of 50,000 blossoms each. Each chamber, holding 1,200 flowers, has 30 racks into which the bunched flowers, with wired-on heads, are fitted. Strip heaters with automatic control are placed under the racks, raised four in. from the floor, and covered with a screen to prevent burning if a flower-head falls.

Girls put the freshly cut blossoms on wire stems and assemble them in bunches of 25. They are then hung on the racks where they stay from 36 to 38 hours, in a temperature ranging from 130 to 200 degrees, when they are ready for packing.

The Coast Wholesale Florists, Inc., a neighboring grower, has three 30,000-blossom chambers and blows heat in them from units on the roof.

The strawflower crop starts coming in June, and the drying time is August to September. During this period the driers are going constantly.

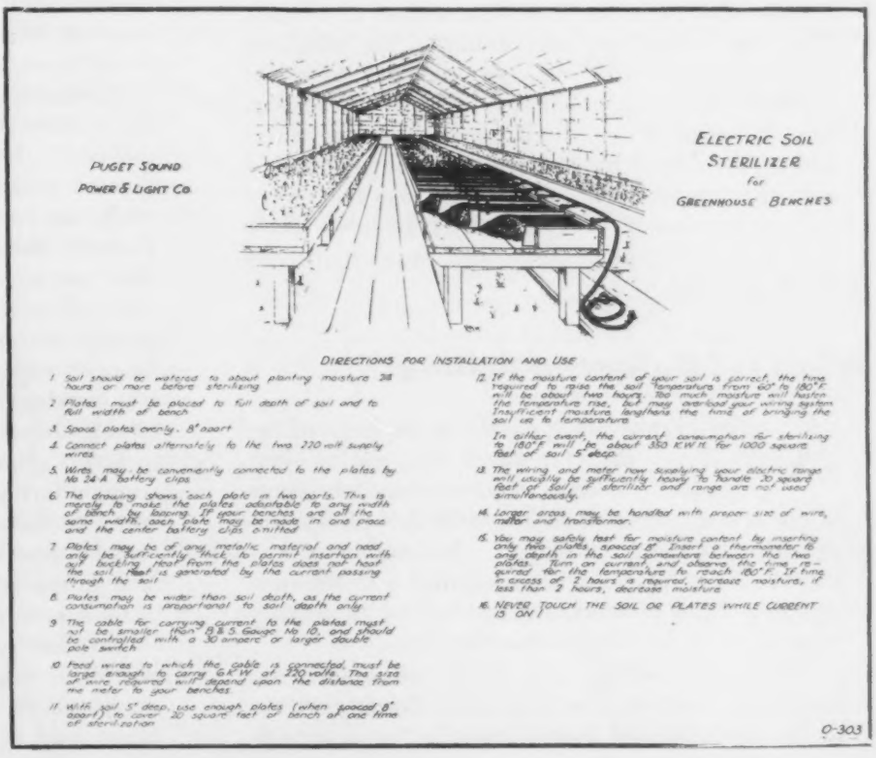
Strip-heaters in the dehydration chambers of the South Canyon Nursery

Electric Soil Sterilization Gains Favor

Among horticulturists the advantages of electric soil sterilization is becoming widely recognized. Using the common resistance principle of electric heating a man can simply and economically raise the soil temperature to 180 deg. F., the point at which seed life is killed and the ground made ready for weedless cultivation.

On the Puget Sound Power & Light Co.'s system the greenhouse operators are supplied with data similar to that shown below. This specification sheet not only gives full instructions as to the electric method of soil sterilization but also a sketch of an installation.

Because soil sterilization is easily sold to those who have weed problems in flower and lawn propagation, this kind of data is particularly valuable as a means of building new load. In addition it often paves the way for more extensive electrical applications in the newer methods of forcing plant growth.


PUGET SOUND
POWER & LIGHT CO.
ELECTRIC SOIL
STERILIZER
for
GREENHOUSE BENCHES
DIRECTIONS FOR INSTALLATION AND USE
1. Soil should be watered to about planting moisture 24 hours or more before sterilizing
2. Plates must be placed to full depth of soil and to full width of bench
3. Space plates evenly, 8" apart
4. Connect plates alternately to the two 220 volt supply wires
5. Wires may be conveniently connected to the plates by No 24 A battery clips
6. The drawing shows each plate in two parts. This is merely to make the plates adaptable to any width of bench by spacing. If your benches are all the same width, each plate may be made in one piece and the center battery clips omitted
7. Plates may be of any metallic material and need only be sufficiently thick to permit insertion with soil backing. Heat from the plates does not heat the soil. Heat is generated by the current passing through the soil
8. Plates may be wider than soil depth, as the current consumption is proportional to soil depth only
9. The cable for carrying current to the plates must not be smaller than B & S Gauge No 10, and should be controlled with a 30 ampere or larger double pole switch
10. Feed wires to which the cable is connected, must be large enough to carry 6 K.W. at 220 volts. The size of wire required will depend upon the distance from the meter to your benches
11. With soil 5" deep, use enough plates (when spaced 8" apart) to cover 20 square feet of bench at one time of sterilization
12. If the moisture content of your soil is correct, the time required to raise the soil temperature from 60° to 180°F. will be about two hours. Too much moisture will lengthen the temperature rise, but may overload your wiring system. Insufficient moisture lengthens the time of bringing the soil up to temperature.
In either event, the current consumption for sterilizing to 180°F will be about 350 K.W.H. for 1000 square feet of soil 5" deep.
13. The wiring and meter now supplying your electric range will usually be sufficiently heavy to handle 20 square feet of soil, if sterilizer and range are not used simultaneously.
14. Larger areas may be handled with proper size of wire, meter and transformer.
15. You may safely test for moisture content by inserting only two plates, spaced 8". Insert a thermometer to any depth in the soil somewhere between the two plates. Turn on current, and observe the time required for the temperature to reach 180°F. If time in excess of 2 hours is required, increase moisture, if less than 2 hours, decrease moisture.
16. NEVER TOUCH THE SOIL OR PLATES WHILE CURRENT IS ON!
O-303

EDITORIAL

Peace—Now For Progress

HOPE that the administration would some day leave off chasing economic mirages and focus its attention on economic realities has been realized in the case of the light and power industry. Extension of the olive branch of compromise and cooperation lifts a cloud which has darkened the outlook for the utilities ever since the New Deal initiated its power policy.

A mutually acceptable treaty of peace backed by mutual sincerity to give it a complete trial should demonstrate once and for all that the utility industry can be a real factor in national welfare. When President Roosevelt said in his message to Congress that "obviously an immediate task is to try to increase the use of private capital to create employment," the utilities came forward with an announcement that there was a work reservoir of $2,600,000,000 in deferred electrical construction. When spread from coast to coast and from border to border, the influence of this program would be felt in countless factories, mills and mines.

Now that the opportunity has become a reality, it rests with the industry to demonstrate its ability. There has never been any doubt in the minds of the people connected with the industry as to its capacity for accomplishment. It has the leadership, the man power, the experience, the products and a past record for achievement. It is endowed with the temperament, the genius and the power to lead the country out of today's business recession just as the automobile and radio industries did in the past.

What is "Balanced Selling?"

A NEW phrase has appeared in the lingo of the appliance industry, where new words often originate. At each of the national showings of the new appliance lines for 1938 this phrase appeared—"Balanced Selling." Noticeable it was that the term appeared in connection with the now complete lines of electrical appliances emanating from each of the major manufacturers.

"Balanced Selling", to these manufacturers, means that their dealers shall not sell refrigerators to the exclusion of everything else, even though refrigerators may enjoy the most acceptance and demand. It means that the new range, the water heater, the washer and ironer shall be sold in proportion to the refrigerator. It means that the manufacturer will expect his dealer to do a more thorough follow-up of previous customers to see that when they buy a new range it shall be one that is companion to the refrigerator previously bought.

Entry of big units of the automotive industry into the electric appliance field already is bringing about a decided change in the picture of selling. For one thing it means a market stimulation on a scale that has been lacking in the past. These big manufacturing units mean business on a big scale. The entire front of home appliances, not refrigerators alone, will feel the advance of their participation. Their demand for balanced selling will bring the deepest penetration of electric appliances into the home market that has ever been accomplished. It can almost be predicted that 1938 will see the long awaited "arrival" of electrification of the home.

To Assure Selective Selling

INCREASING responsibility befalls utility commercial men as rates go down and operating costs rise. With them rests the job of maintaining net revenues at levels which will assure financial stability. To do this they are faced with a problem of selective selling. Sales effort must be expended only on those classes of new business which will assure a net profit.

To discharge this responsibility successfully the commercial men of necessity must have the full cooperation of other departments. Especially must sympathetic understanding and help come from the engineering and accounting divisions of the utilities. Important questions involving all of these departments require answering before sales work can be programmed with any assurance that it meets the test imposed by today's conditions. Here are some of these questions: What classes of load are most profitable? How much can be expended reasonably to secure various types of load, i.e., commercial lighting, industrial heating, electric cooking? What is a reasonable over-all ratio of sales expense to total gross revenue?

Today there is too much guesswork and not enough factual information to permit definite answers to these questions and reasonable comparisons between different companies. So commercial men grope in the dark, and perform to the best of their knowledge and ability.

Here are some examples of how these other departments might help: Engineers could conduct a study which could definitely prove that electric range load is valuable and thus offset the propa-

ganda which is being fostered by the gas interests in the competitive warfare against electric cookery. In one utility tests have been conducted by engineers which show that a multiplicity of units of poor load factor business when combined produces a satisfactory load factor. Heretofore commercial men have shied away from individual units of this type of load. Other similar tests might be helpful. Accounting departments which are now engaged in setting up the new F.P.C. classification of accounts might include subdivisions which would permit accurate determination of the costs of securing various kinds of business. They also could standardize the interpretation of the new classifications between companies so that accurate comparisons of load-building costs could be made by commercial men of the different companies. And there are many other opportunities for cooperation.

The commercial men are equal to the new responsibility that has been placed upon them by management. And assistance rather than criticism will make their task easier.

Mass Production Wiring

WILL the same thing happen to wiring that has already become an accomplished fact with home appliances? Earl Whitehorne, editor of *Electrical Contracting*, warned the industry that it might. It is not beyond plausibility that when 22 million homes need more copper to bring them the undiluted efficiency of electricity and realize this need, whatever agency is prepared to meet that demand will step in to do so. The old line agencies of the industry will no more survive than the old line contractor-dealers did as sole outlets for appliances.

Contracting during the past half century has been a custom-built or tailor-made sort of business. Every customer had to have something cut to suit his individual measurements. The same used to be true of other businesses too. But the real money in clothing or anything else came when a factory-built job, with a few minor alterations, made it possible to sell more suits to more people at less money. Perhaps the individual differences of houses has been over exaggerated. Possibly a factory-built wiring assembly could be devised and adjusted to the individual fit of every home with minor alterations. Certainly the thought is worth investigation.

"You can't turn your back on 22 million homes," Mr. Whitehorne warned. The village blacksmith fitted individual shoes to every horse's hoof. But the automobile which made him obsolete is the product of factory production and standardization. The wiring industry should think seriously of this possibility, should prepare its own salvation out of the experience of other industries.

ELECTRICAL WEST

DEVOTED TO THE ECONOMIC PRODUCTION, TRANSMISSION AND DISTRIBUTION OF ELECTRIC POWER AND ITS APPLICATION TO INDUSTRY, COMMERCE, AGRICULTURE AND HOME IN THE PACIFIC EMPIRE, AND TO THE MARKETING OF EQUIPMENT AND APPLIANCES AND OTHER UTILIZATION DEVICES IN THAT AREA

Full Steam Ahead

LOOK twice at Tucson's new turbine. Doesn't amount to much? Exactly. It's tiny. The 6,250-kva. turbo-generator set is squeezed in among a roomful of diesels. That's why it deserves another look.

For years now the good and bad points about various types of prime movers have been considered to be fairly stabilized, fairly well defined. But here is steam making new bids for favor.

The Tucson turbine has been referred to as a "package job", a "vest-pocket unit", etc. That's because it is installed in a space into which no other practicable prime mover of equivalent power would fit; because a new scheme for disassembling eliminates the usually required end-room; because it can, if necessity demands, be picked up as a unit, set down for operation somewhere else, without any great weight obstacle to transportation. It is compact and mobile.

Contributing to initial economies in space and money is the outside boiler from which the turbine draws its steam. Boiler and machine together are a source of power which challenges the swift obsolescence of a given method or a given place which is the order of the day.

Thus steam, which stood in the vanguard of prime movers that brought about the era of machines, steps forward toward tomorrow.

Rural Electrocution

SAVING a cow's life doesn't mean so much as saving a human life, but in this case it indicates the value of teaching all electrical workers artificial respiration.

A LaCenter, Washington, cow recently wandered into a Northwestern Electric Company 2,400-volt line knocked to the ground by a falling tree. The cow bit the earth.

Two Northwestern employees, passing by soon after, discovered the animal, sent for the claim agent and then tried to put life into the "corpse." One used an ammonia inhalant; the other pumped air from a tire pump into the cow's lungs.

Just as the claim agent appeared on the horizon, the cow sighed, snorted, jumped to its feet and sailed over a fence toward home.

Complex Southern California Contractor Setup Explained

TO understand the intricacies of the organization of southern California contractors was recently more than most members of the industry were able to do. A sweep of new associations, exchanges, federations, councils had come into the field to leave the industry wondering as to the relative relationship of these organizations. A clarification of the problem has been made by J. Edward Chandler, president of the Los Angeles Electrical Contractors Council and active in the establishment of the various groups.

After the NRA code, a period of uncertainty caused the contractors in the Los Angeles area to look around for another means of banding together. The voluntary code of the National Electrical Contractors Assn. was finally determined upon and last fall an organization known as the Los Angeles Electrical Contractors Council was incorporated.

To be members of this council a requirement was made that each man must also be a member of the national association. In line with the trend of the times it was also decided that each member employ union journeymen. Work at the time was largely on PWA projects and these requirements were found advantageous. The Council maintained a separate identity from the Los Angeles branch of the National Electrical Contractors Assn. and from the Southern California Chapter as well, although all its members were members of these organizations.

Following the successful organization of the Council, and in cooperation with the I.B.E.W., Roy Gruendler, a former contractor, was engaged to organize the other contractors in the region. Twelve groups known as Electrical Contractors Exchanges have been formed in the following cities and with the following as presidents in each case. Santa Ana, R. Allen; North Orange, W. Foster; South Orange; San Pedro and harbor, W. J. McWhinney; Long Beach, Roy Baty; Santenella (Inglewood), B. H. Kirkhuff; Beverly Hills, L. A. Baker; Santa Monica, R. L. Doman; Huntington Park, Lou Muller; Pasadena, H. Bayers, and residential Los Angeles, Andy Smith. The combined membership of these exchanges now totals about 350 and plans are under way to form a general federation as a means of correlating the activities of the various exchanges and the council. Bid depositories have been established in West Los Angeles, Pasadena, Inglewood, Beverly Hills, Santa Monica and Huntington Park.

Legal counsel for the group is Harry Biddle, trade association attorney. In its arrangement with the union, a uniform scale of $9-a-day prevails except in Long Beach where a previous agreement provided for a $10-a-day wage scale.

Organization work to establish other exchanges in other southern California cities or districts is continuing under the joint action of both the union and the business manager of the California Electrical Exchange, as it is called, Roy Gruendler. Al Evans is secretary of the group.

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Contractors Discuss Sales Agreements, Code

Manufacturers' sales agreements, arbitration and trade practice laws, changes in the new edition of the National Electrical Code and interesting pointers about the use of the sales data book were on the agenda of the Electrical Contractors Association of Northern California's last 1937 meeting to be held at Hotel Benjamin Franklin, San Mateo, Dec. 4. Frank Boyd, president, Pacific Electric Motor Co., Oakland, announced the program.

Among the speakers were to be J. D. O'Connor, Sacramento, discussing manufacturers' sales agreements; Walter J. Walsh, San Francisco attorney, speaking on the arbitration and fair trade practice laws; A. L. Stone of Los Angeles, Pacific Coast's National Executive Committeeman, National Electrical Contractors Assn.; Harold L. Gerber, Department of Electricity, San Francisco, speaking on the National Electrical Code changes; William A. Cyr, ELECTRICAL WEST, repeating his talk, "I am your Customer", given at the N.E.C.A. convention, Los Angeles, and R. W. Griffin, Crown Electric Co., San Francisco, discussing interesting points about the use of the "Data Book". Seth Cohn of Acme Electric Co., San Mateo was to be host for the meeting.

Anaheim Inspector Heads So. Calif. Chapter

A. J. KAY, city electrician, Anaheim, Calif., was elected new chairman of the Southern California Chapter, Southwestern Section, International Assn. of Electrical Inspectors, at the first meeting of the fall season, held at Santa Ana, Nov. 17. G. E. Price, county inspector, Orange County, presided as the retiring president. Herbert Ufer was reelected secretary-treasurer.

The new edition of the National Electrical Code, it was voted, will be taken up article by article to familiarize members with the new arrangement of contents and also with recent changes. Interpretation of each article will be discussed so that more uniform understanding of the Code may follow. At the next meeting on Jan. 19, R. H. Manahan is to discuss articles 210 and 220, dealing with branch circuits and feeders, and H. V. Dobson will discuss article 230, on services. The meeting will be in San Bernardino.

During the morning "inspectors problems" session, Arthur Veit, Los Angeles county inspector, told of the preparation of a county ordinance governing installation methods on X-ray machines in citrus packing plants by the request and with the assistance of the citrus packing industry. He also recommended that cities adopt the uniform electrical code.

H. G. Dodge, of Underwriters Laboratories, gave an interesting description of tests made on flush type lighting fixtures and recommended that slow burning wire be run from the fixture to an outlet box at least two feet away in which connection could be made in the box to rubber-covered circuit wiring.

Luncheon hosts were the electrical contractors of Santa Ana, the meeting entertainment program being presided over by A. C. Gilbert of Gilbert, Weston and Stearns. W. O. Packard, city electrician, Santa Ana, was host to the meeting itself. After adjournment members were taken out to witness a field demonstration of a new deep subsoil plow which turned earth over from a depth of six feet. Mr. Price has been active in the development of this gargantuan plow so useful in turning over new soil in the sandy river bottom washes along the coast.

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PAYROLL RECORDS, showing data from which taxes are paid and reports furnished, should be preserved for not less than four years, the Biddle Trade Bureau recommends to employers.

More N. E. C. A. Convention Papers in Brief — [Containing Valuable Ideas for the Industry]

Apprentice Training

By J. WALTER COLLINS, Secretary,
Electrical Contractors Association of City of Chicago, Inc., Chicago, Ill.

Do we handle labor in such a manner as would definitely set us apart from our miscellaneous competition? How does our manpower compare? Where do we get them? What is the extent of their training when they come to us? Do we need in addition to a strong back and willing hands, a touch of technical knowledge?

Are these men thoroughly trained so that we may call them electrical mechanics and, therefore, set them apart from the putterers who are concerned only in that they may do a cheap job that will apparently place into operation the apparatus or materials involved in the individual job?

If we will honestly analyze this matter, we will find that we have been recruiting our mechanics from about the same source as our competitors. We expect our men to secure their training from day to day at the customer's expense and through errors committed. . . .

This is not the process that has made it possible for other branches of our industry to develop so that we can proudly say we are part of a business that constitutes the third largest industry in the country. All other branches have accepted their responsibility in this matter and have done their own development. Any business that intends to lean on any source other than themselves is on the way to the poorhouse and any business that attempts to law itself into profits is certainly a first class leaner. . . .

Let us look into what has happened to this business in the past eight years as far as man power is concerned. We have whittled our forces down to the bone, retaining only our oldest and most trusted employees, all of whom are eight years older. At least one-third of them are on the down grade and we have done nothing to replace what these eight years have taken out of them.

The result being a rising labor cost that provides such a large gap between us and mob competition that our customers are encouraged to take a chance on the mob. This is the reason we have this type of competition and all the wailing and gnashing of teeth and restrictive ordinances and laws won't help the matter at all. We must meet these facts as they exist and immediately correct the situation. . . .

I have studied in the past few months all of the apprentice plans that have come to my attention through government agencies and find that we have in our own trade, a plan that has been worked out over a period of 15 years of actually training young men for this work which I can unquestionably recommend to the association and to the contractors as, at least, a plan sufficient for our immediate needs. . . .

I think it would be fair to assume that the skillful handling of materials and apparatus be considered as approximately 70 per cent of what it takes to produce a satisfactory job. We have a very peculiar occupation. We must have faultless work and we must provide for a safe conduction of an unseen and unknown product.

There is no greater application of the adage "The chain is no stronger than its weakest link" than is experienced in the conduction of electricity. No other trade depends as much upon faith as this trade. Most of our work is covered up by other trades and only a small portion is available for any sort of inspection and its proper operation can only be determined after the work is completely finished.

Host to the convention, A. L. Stone, welcoming the delegates to California

We might assume that most of this knowledge and detail is a function of the contractor or his foreman. This is not the case in this trade. As I have stated before, at least half of the time our mechanics are required to work without supervision. This requires that all of our men must have training in the techniques of the business.

I have been connected with contractors in association work for the past 26 years and I have found a limited number who have a knowledge of the business that could be secured through an apprentice training program. This lack of general knowledge among the contractors may be the reason why we all have become specialists. Some of us are engaged solely in old house wiring, new homes, fixtures, maintenance, power, large commercial buildings, and others go so far as to specialize in one type of commercial work.

This practice narrows the field and produces the strictest brand of competition. It deprives the mechanics of a general knowledge of the work and therefore limits the supply of capable mechanics.

We will continue being harassed by our miscellaneous competition, if we don't immediately take steps to separate ourselves from them by reason of producing something of value they cannot supply. . . .

I recommend that we go so far as to indenture apprentices to individual contractors and holding both the employer and employee responsible for the faithful adherence to the course of study and practical work prescribed, and upon completion of the work a certificate evidencing the apprentice's ability be issued by our national association. . . .

I suggest, however, that the management and direction remain within our organization, because I find very little depth to the present federal program.

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Industrial Electrical Modernization

By K. D. WHITE,
Walker Electrical Co., Columbus, Ga.,
Secy., Southeastern Industrial Chapter, N.E.C.A.

You often hear the statement made that "It costs too much, we cannot afford it." Right there is the time to call your prospect's hand on that point. The fact is that it is remarkable how little good lighting costs relatively. The capital assets of the average manufacturing plant that is adequately lighted show that land and buildings, are carried at approximately 18 per cent, machinery, tools and equipment 32 per cent inventory, receivables and cash 50 per cent and the investment in lighting installation only 2 per cent. How foolish to spend thousands of dollars on elaborate machinery and train men to operate it efficiently and then withhold the lighting that is necessary to enable them to do that for which they are paid. You would not hire a blind man to operate a loom but that is practically what you are doing . . .

You also hear it said, that "It costs too much to operate." Again, the books of a plant having adequate lighting will show that out of every hundred dollars charged to production cost, $5.90 goes for salaries, $16.50 to wages, $52.00 for materials, $2.40 for fuel and power, and $22.90 for advertising and sales cost, insurance of various kinds, interest, depreciation, and profit with thirty cents paying the light bill, less than 2 per cent of the payroll and this smallest item affects all the others. In the wage block, good lighting promotes greater efficiency, makes less eye strain and hence conserves the vision, creates less accidents with their resultant suffering and loss and makes for better working conditions which helps to lower labor turnover. In the material block, good lighting produces less spoilage, promotes quick and accurate inspection and results in a more uniform and better product.

The plant owner and manager are always troubled with production problems and are always interested in any discussion that leads to lower costs through increased production and lower maintenance costs. The contractor who has an opportunity to make a power survey will generally find drives that are obsolete, motors misapplied, controls inadequate, that modern equipment can profitably replace, and by the careful use of recording wattmeters, ammeters, voltmeters and speed indicators, records can be obtained that cannot be disputed and which can be used to prove your point to the owner that not only should his old equipment be laid aside but that he cannot afford not to do so.

In many industries, presses are used to bale finished goods into shapes suitable for shipping. You are all familiar with the press operated from a shaft to a jack shaft with a series of drives to enable the operator to raise or lower the press as he found necessary. A contractor friend, who was applying motors to a steam driven plant, had to motorize such a press along with other equipment. He selected a motor of proper size and speed and belted it directly to the driven press shaft, eliminating two drives that had been used for raising and lowering the press and controlled the motor with a push button operated magnetic reversing motor starting switch. Now the motor is only used when actually needed to press goods and then only so long as the operator keeps his hand on the button. This simple application, among others, so pleased the owner that other suggestions of the contractor were readily given approval.

Earle Whitehorne, in describing the sight meter gadget, said he hoped someone would get up another gadget that could be used successfully in power applications. I believe we have such an instrument in the little indicating ammeter that is mounted on a gadget that looks like a pair of scissors, save that in this instrument the cutting edges are eliminated and formed into the shape of the letter O, split in two places so that by squeezing the handle you open up the form

enabling you to enclose any conductor of a circuit and tell accurately the amount of current flowing in that particular wire of the circuit. They are so calibrated that you can readily read current values ranging from five amperes to six hundred amperes accurately. The use of this instrument never fails to create interest and is invaluable in making a quick survey to determine whether current values are too high for the wire involved, to determine whether circuits are balanced and for use in determining whether more extensive investigations should be undertaken. . . .

I doubt if there is more than a small percentage of contractors who have really considered the possibilities created by power factor studies.

Necessarily, the first thing to do in such a study is to use your recording wattmeter, power factor meter, voltmeter and ammeter to see how you stand, and then you can determine accurately the amount of corrective equipment needed to produce any result that is wanted, and knowing wire sizes and lengths, etc., etc., it is not difficult to determine the return that can be made on the investment required. I have in mind a plant, where such an installation returned seventy per cent on the investment, and the beautiful thing about it was, that you could absolutely prove it by your charts taken before and after the installation was made and then again such jobs are rarely competitive. . . .

We are all familiar with the use of electricity for heating domestic water in the house, but how many of you have given any thought to this simple problem? Electricity for heating is dependable, the temperature control and distribution are accurate, its regulation is automatic, one is assured that similar operations can be duplicated and the experience of many users of electricity in handling heating problems indicates that its cost is comparable to other methods of producing heat. . . .

The government itself is not helping modernization and improvement in industry by its tax laws. In the revenue act of 1936 we find the "undistributed profits tax" which has caused many a modernization and expansion program to be held up. The owner reasons that if he invests a sum in plant improvements, he will have to pay the undistributed profits tax on the amount so expended and therefore an improvement costing ten thousand dollars, say, really costs about thirteen thousand dollars and it therefore becomes necessary to show that a reasonable return can be made on the larger amount or the improvement is not made.

This certainly is holding up improvement programs running into the hundreds of thousands of dollars, and leaders in Congress are recognizing this fact, for two different bills have been introduced in the Senate to correct this unfair tax which is retarding proper development and expansion in industry. The first is Senate bill No. S979 introduced by Senator King and the second is Senate bill No. S2852 introduced by Senator Duffy. Both bills were referred to the Committee on Finance of the Senate and will come up at the January session, and I suggest you contact your Senators and Representatives and urge their support of this particular legislation.

Work executed by a plant's own forces is never done as carefully or as well, for they lack supervision, the costs of the work are rarely accurately kept and it is unfair to a plant electrician, who never gets an opportunity to observe the improvements being made in other plants similar to his, to expect him to be able to advise his employer regarding modern methods as well as the contractor can who deals with such problems daily, therefore, when he is called upon to do some job, he purchases material to do the work as it was done before rather than in the most modern way and the manufacturer and the jobber loses, for the job is held down rather than built up and the employer loses, for he does not get the benefit of the most modern economical methods . . .

We should all pull together in an endeavor to retain to electrical contractors all installation work in industrial plants, and we should have no trouble demonstrating that we can do the work cheaper over a period of time, because, quantity buying of similar articles reduces costs, only material necessary to the job is billed the customer, he has no leftovers to accumulate which may never be used, only labor necessary for the job is billed the customer and when the job is done, the labor ceases, tools and equipment furnished by the contractor do not stand around to depreciate, the owner has no investment to carry. We should have no trouble demonstrating that the job will be done better because the contractor is familiar with all new developments in materials and methods, only the proper type of material is used on the job, experience in other plants gives the contractor broader knowledge from which to devise the best solution of the problem at hand, the contractor has an organization capable of drawing, designing and recording any changes that are desirable, the contractor is able to supply men who are specialists in various branches of the work.

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Motor Repair Shops

By WM. J. WHEELER,
The Maintenance Co., Inc., New York,
President, National Industrial Service Association

In the first place, both contractors and service shops are identified with the same responsibility. An adequate installation having been completed, the service industry is then called upon to repair and maintain the completed installation in efficient and safe operating condition.

In the second place, this very mutuality of interests has resulted very often in both contracting and servicing departments being organized in the same firm.

Moreover, both the contracting and service industries are in a similar relation to the other branches of the electrical industry—namely, our relation to the manufacturers, wholesalers and public utilities. And thus we can and should cooperate in the solution of our common problems.

On the other hand, the operating problems of our service shops are distinct from those of electrical contractors. Service shop operations are more standardized. Their business involves the equipping, maintenance, operation, and other problems incident to the running of a shop—problems comparative with those of any manufacturer. Their problems of labor and cost control are therefore vastly different from those of the contractor.

I want briefly to outline a few of the major objectives and activities of the National Industrial Service Association.

First, let me say that our National Service Association recognizes the absolute necessity of local group organization in our industry—whether they be city, state or sectional groups. This local grouping naturally depends on the competitive area.

Second, we have found that annual national conventions of our service industry are of interest and profit to the shops. The National Industrial Service Association has in the past three years run one two-day convention and two three-day conventions.

Third, our objectives naturally include the improvement of quality workmanship and ethics in the service industry.

A fourth objective is the assembly of price data, methods of pricing, etc., and the distribution of such data to our membership.

Fifth, there are the problems of relationships with other branches of industry, such as the electrical manufacturers, jobbers, and electrical contractors. These problems of course involve fair competition, sound trade practices, prices, discounts, etc. It is at once apparent that such problems can only be effectively handled on a *national* scale.

Sixth, a national service association is require to represent effectively our interests before national, sectional and state governmental authorities from time to time. This has become of increasing importance of late.

A seventh objective is found in our efforts to provide an efficient and satisfactory clearing house for the exchange among our members of rebuilt motor and control equipment, the adoption of classifications and standards, and the stabilization of prices, discounts and other trade practices on rebuilt equipment.

Eighth, I believe that a representatve organization and particularly a national organization does a job for its members that is often not fully appreciated. I speak of the contacts made with men in the same line of business, the appreciation of the fine type of men in the industry in which we are spending our lives, and the resultant satisfaction and pride we can find, in addition to the monetary rewards, in being identified with our own particular industry.

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Association Work

By J. J. NEWITT, Secretary,
Southern California Chapter, N.E.C.A.,
Los Angeles

It has been my experience that there are three types of interest evinced by association memberships, and strangely enough the letter H stands out prominently in two of them. One is the "Hurrah" type and the other is the "What-the-Hell" type.

The Hurrah interest is the one we find in great and luxuriant abundance when a new association is being formed or an old one is being revived. It flames up like a pyrotechnical display and illumines the surrounding landscape for a brief period and about the only lasting marker that survives is the period. This type is too intense to be permanent, and is inspired only by a superficial knowledge of the problems involved.

The "What-the-Hell" type of interest is even worse than the Hurrah type because it springs only from selfishness and may be likened to the boll weevil's reactions to the attempts of the cotton grower to save his crop. The What-the-Heller is the fellow who asks asinine questions, such as "What does the Association do for me?"; "What are you doing about the $2 an outlet guy?" and the many others that are spawned in a vacant and dusty cranium. He is afraid that his competitors will find out his method of doing business below cost and take all his volume away from him. The disgusting thing about this type is that he does not understand the language in which the answers to his questions must be framed. It's just impossible to get him to take an interest in doing anything that might benefit his competitor, even though he, himself, might profit thereby. He hates his competitor heartily and does not care very much for himself. He usually joins the association for the purpose of finding out how he can profit at the expense of others.

The third kind of member interest is that out of which is built the associations that function. It is found in the contractor who knows his own business and appreciates the difficulties confronting others in the industry. He is willing to and does give his time and financial support to many movements that at first may look visionary, but because of the sound thinking that he brings to bear upon them, constructive action usually emerges. We "thank whatever gods there be" for this try thrives and prospers.

NEWS OF THE INDUSTRY

FPC ASKS COURT TO SCRAP REPRODUCTION COST THEORY

In an effort to sustain the principle of prudent investment instead of the reproduction cost theory now serving as a basis for rate fixing, the Federal Power Commission last month went into the Supreme Court proposing that the court discard a line of decisions dating back 39 years.

The issue arose in the case of the Pacific Gas and Electric Co. vs. the California Railroad Commission involving the validity of a gas rate slash ordered by the commission in the San Francisco-Sacramento area.

Prior to the court appearance, the power commission submitted a brief stating that "the case presents issues of great and general public importance, the decision of which will virtually affect the commission and other regulatory agencies similarly constituted in the conduct of their official duties." The principle of reproduction cost, the commission maintained, has had a fair trial and has been found wanting; its continuance will render "well-nigh impossible" the administrative task of fixing electrical rates.

On the other hand, the commission stated, "a sound basis upon which the public utility properties should be valued for rate-making purposes is the historical cost of those properties—that is, the prudent investment in them. It believes that such a basis is entirely consistent with the requirements of the Fifth and Fourteenth Amendments of the Constitution."

COLORADO-BIG THOMPSON PROJECT ON CARPET

Arguments about the feasibility of the proposed Colorado-Big Thompson trans-mountain diversion project of the Bureau of Reclamation were heard by Secretary of the Interior Harold L. Ickes Nov. 12. The proposal is being fought by many organizations because it involves tunnelling beneath Rocky Mountain National Park.

The project calls for diversion of surplus water from the west side of the continental divide through a 13-mi. tunnel to the eastern slope, where it will be used to protect from deterioration 615,000 acres of highly developed agricultural land assessed at $125,000,000. Cost to irrigation would be $24,666,079, ultimate total with power, $44,000,000.

WASHINGTON DEPARTMENT OF PUBLIC SERVICE has ordered the Puget Sound Power & Light Co. to "cease the practice of offering or selling energy to owners and operators of buildings for resale to tenants unless the energy is received and paid for through a master meter at regularly filed and published rates." Although the order did not affect Seattle City Light, David Levine, chairman of the City Council utilities committee, stated that the findings would be accepted and an ordinance prepared to enforce a similar rule.

Christmas Cheer

SPONTANEOUSLY the little colored lights of Christmas have appeared again. No need to suggest, to coax or remind—they appear of themselves nowadays. Throughout the West, from Denver, the "Christmas City" to the far ends of the Coast, every town and city will be twinkling, homes will be lighted, outdoor trees and shrubs decorated and brilliant. Newspapers, chambers of commerce, garden clubs are sponsoring contests and outdoor tree plantings.

Outdoor Christmas Tree Assn. of California, founded by Clarence Pratt, tells of statewide meetings, of extraordinary activity in some regions. Humboldt county will top all others. Enthusiast Wm. L. Stevenson of Fortuna has organized the entire county. A mile and a half of trees along the highway between Eureka and Arcata will be lighted. The tallest tree in the world, whose first limbs are 275 ft. from the ground, will be strung with lights by professional tree toppers. A 7-mile caravan of 400 cars will tour the county to see the lighted trees in front of all the homes.

"Christmas Out of Doors" is what Los Angeles county will call its organized activity, according to Virginia Potter Moore, director of the Outdoor Christmas Tree Assn. Contests and programs are planned by the newspapers of San Francisco, Fresno, and other cities. San Jose's Junior Chamber of Commerce will sponsor that city's program. Portland, Spokane, Seattle, Salt Lake City, Ogden, are veterans in the handling of such decoration promotion and will blaze anew this season.

ROOSEVELT APPROVES BASE FOR BONNEVILLE RATES

Although J. D. Ross stepped squarely into the spotlight when he was appointed Bonneville administrator six weeks ago, the wealth of pronunciamentos which, throughout November, followed this event still left the two main Bonneville issues in dark shadow. These issues are rates and markets.

Faint ray on the first was the announcement that President Roosevelt had approved a 3½-per-cent interest rate and 40-year amortization period as the bases for rate fixing. This, however, leads nowhere until Bonneville's costs are divided up between navigation and power. Such a division the Federal Power Commission is now attempting to perform.

Most recent estimate of Bonneville cost approximated $51,000,000, and a suggested allocation of costs to power, advanced unofficially, was: powerhouse 100 per cent, navigation locks 0, most everything else 50 per cent. This would charge to power some $28,000,000.

Light of doubtful color was cast on the markets issue:

"As quickly as possible," said Ross, "there should be a line from Bonneville to Coulee."

Where immediate loads could be found and how served remained dim.

Ross's expressed hope that the 3½-per-cent, 40-year system become the yardstick for all federal power projects aroused conflicting comments with regard to its effect on Boulder Dam. Boulder is set up at 4 per cent, 50 years. The Portland *Oregonian* said application of the proposed uniform rate to Boulder would be a windfall to Los Angeles. The Los Angeles *Times*, however, said the proposal would increase the burden, the lower interest rate being more than nullified by the higher rates for amortization.

BY A MARGIN made all the more decisive because a two-thirds majority was required for passage, voters of Redwood City, Calif., last month defeated two measures which would have put the Pacific Gas and Electric Co. out of business in that town. The first measure, proposing a $575,000 bond issue to purchase P. G. & E.'s power distribution system, was vetoed 1,767 to 687. The second, proposing the same amount of bonds to set up a competing system, was vetoed 1,780 to 655. Prior to the election the City Council had been divided 4 to 3 on the question.

Construction Starts on Central Valleys Project

Actual construction of California's Central Valley's Project got under way late in October when steam shovels, biting into the ground on the edge of Ash Creek, near Antioch, started work on the 50-mi. Contra Costa Canal. Contractors in charge of the work are Haas, Doughty & Jones and Marshall & Stacy of San Francisco, who bid jointly on the initial construction of the first four miles of the waterway.

Meanwhile, in Washington, the Bureau of Reclamation announced revised plans providing for an increase in the size of Shasta Dam which will make the structure the second largest concrete dam in the world.

Revised design calls for a straight concrete gravity dam approximately 560 ft. high, 3,100 ft. long and containing 5,700,000 cu. yd. of concrete. Reservoir capacity will be 4,500,000 acre-ft., an increase of 1,500,000 over original plans. Initial power installation is set at 280,000 kw. with provision for future enlargement to 350,000 kw.

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Montana Public Service Commission last month approved the application of Montana Power Co. to reduce wholesale power rates over the entire State of Montana. New rates will be approximately 25 per cent below the original wholesale power rates.

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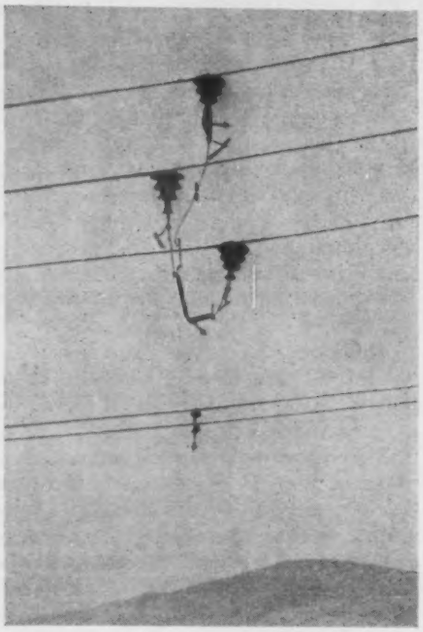
Alta Electric Bids Low on Bay Bridge Transit System

Lowest of three proposals on construction of catenary and feeders for the electric interurban railway system across the San Francisco-Oakland Bay Bridge was submitted last month by the Alta Electric & Mechanical Co., San Francisco. Amount of the bid, covering work on the main bridge, the San Francisco loop and the East Bay yard, was $484,507.

In other action on the bridge front, Pacific Gas and Electric Co. placed with General Electric Co. an order for four 2,000-kw. and two 1,000-kw. rectifiers, 625 volts d.c., with the transformers, automatic switchgear and degasifiers. This equipment will power the Key System's 600-volt third rail with power to operate cars.

A second order was placed with G.E. for equipment to serve the 1,200-volt trolley of the Southern Pacific system. Included were four 2,500-kw. 1,300-volt rectifiers with transformers, automatic switchgear and degasifiers.



Lightning which accompanied a recent storm in the district of Kennewick, Ore., went harmlessly to ground near one Pacific Power & Light Co. line (at top) but played queer tricks with the 66,000-volt line to Umatilla. Covering his beat the day after the storm, a patrolman discovered one pole missing, only the insulators and hardware left (below). Investigation disclosed the pole had been struck by lightning and all wood parts completely consumed by fire. So neat was the job, however, that not even a momentary interruption of service was reported

Roberts & Broad, Spokane, has been awarded a contract by Benton Rural Electrical Assn. to construct 43 mi. of power line from North Prosser, Wash., to Benton City. The firm's bid was $34,995.

Fischer and Gendron Appointed by Ross

Returning from Washington to his new offices in the Failing Bldg., Portland, J. D. Ross, recently appointed Bonneville administrator, last month plunged into active life of appointments, statements and speeches.

First appointment was that of John C. Fischer, Seattle and Washington, D. C., attorney, as chief counsel of the Bonneville project. Mr Fischer was previously Mr. Ross' personal legal counsel on matters of finance pertaining to Seattle City Light. In 1933 he was named by President Roosevelt as one of the judges on the Board of Veterans Appeals.

Second appointment was that of U. J. Gendron, former assistant to the director of the PWA power division, as Mr. Ross' executive assistant.

Major activity of Mr. Ross, however, was the task of acquainting the public with his policies and ideas in regard to Bonneville. Significant excerpts from his speech before the Power League in Portland follow:

"As soon as the Federal Power Commission makes this decision (regarding the total cost allocated to power), the Administrator will take its figure and in it take a rate of 3½ per cent interest charge. To this will be added 1.183 per cent to cover amortization of the capital cost in 40 years.

"The life of the plant, on account of its heavy construction, reaches very far into the future . . . .

"It is not intended in the Act that current will be sold to individuals in a city or district. It is intended that the people shall distribute their own current . . . .

"The object of the Bonneville plant is to bring cheap power to those who pay for it . . . not to make tax-free cities or districts . . . .

"There is at present a combined demand of 1,616,000 kw. in the three states tributary to Bonneville . . . Sixteen counties of Washington State have already formed into public districts. These alone will require one-quarter million kw. of the machinery at Bonneville.

"The Bonneville law requires that half the power be set aside for a reasonable time for public power districts. This quarter-million kw. is more than half of the Bonneville plant with all ten units installed . . . The private companies will, under the Act, get the same price as the districts or cities, but their contracts will be drawn for only five years . . . As to the rates that the private power companies will charge, it is sufficient to say that their destiny

A THERMOMETER THAT CHECKS *on all points!*

PRACTICALLY INDESTRUCTIBLE
(all metal)

READABLE
(gauge type dial)

PERMANENCY OF CALIBRATION
(no gas, no fluids)

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(accuracy 1% over entire scale)

RAPID RESPONSE

EASY TO INSTALL

Sectional view showing operating parts of WESTON *Industrial Temperature Gauge.*

Frequent thermometer replacements avoided! Errors in reading eliminated! Time saved! Costs lowered! . . . these are some of the results which follow the adoption of WESTON Industrial Temperature Gauges.

Operating on a new but thoroughly proved *all-metal* principle, these thermometers are not affected by severe vibration or over-temperatures, and require no correction (such as capillary or heat transfer correction) regardless of stem length.

WESTON Industrial Temperature Gauges now are available in ranges up to 1000°F. . . . stem lengths up to 24 inches. You will want complete data. Return coupon today.

WESTON
Temperature Gauges

Weston Electrical Instrument Corporation
577 Frelinghuysen Avenue, Newark, N. J.

Send complete information on WESTON Temperature Gauges.

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City..... *State*.....

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Herman E. Held,
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Off-peak Loads
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MODERN METERS

Sangamo Type HV-S-2
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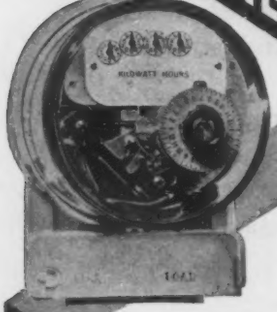

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Meter and Time-Switch
in "A" Base

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SANGAMO
ELECTRIC
COMPANY
SPRINGFIELD, ILLINOIS

is in their own hands . . .

"Bonneville rates must be so formed as to stimulate irrigation by pumping, either direct to each farm or by pumping into reservoirs and supplying small areas by gravity from such reservoirs . . . Mining can be made a wonderful asset to the Northwest, and rates should be such as to stimulate it . . . The pulp and paper industries are rising to considerable proportions. The rates must assist in this long-hour pad, and in all such loads where industry is found . . .

"There are certain industries, such as the making of aluminum, which use comparatively little labor but use great amounts of electricity. The plants were paid by all the people of America, so the returns should be distributed as widely as possible. To put the entire Bonneville production into two or three such plants, as some advocated, does not fulfill any humanitarian ideal or any national service. It would not reduce unemployment and it would not upbuild the Northwest, which is our great desire. However, in making a balanced use, it is reasonable that 15 or 20 per cent of the output of Bonneville can be put into such work, especially if the industries sought give a fair amount of employment.

"In order that there be no lost money through temporary work, we should develop a long range plan in which all is coordinated, and in which each step now taken would be a proper step in the whole plan. Bonneville and Coulee should be inter-tied as part of the Columbia system. The other plants on the Columbia River, to be built later, would normally fit into this system.

"There should be a switching station, probably at Umatilla or Pasco, approximately half way between the two plants. From this switching station a line would reach Boise. From the Coulee a line would go over to Missoula. From Bonneville a line would go through Portland down as far as Eugene. These points are, roughly, about 125 miles apart. From them would radiate lines at 110,000 volts and 60,000 volts, according to the necessity of the districts served. This would make the radius of transmission from these centers about 65 mi. . . .

"The Bonneville personnel will be comparatively very small. The rank and file must be taken from the U.S. Civil Service, and these must be drawn from existing lines . . . ."

●

WINTER OF 1937-38 will be slightly warmer and drier in California than the average for the years since 1916, Dr. George F. McEwen, physical oceanographer at the University of California's Scripps Institute of Oceanography, predicted last month.

Hearing on Feather River Project to Be Continued

Fate of the Pacific Gas and Electric Co.'s proposed power developments on the Feather River was shrouded in doubt last month.

After hearing arguments for and against the company's application, Examiner Frank A. Hampton, representing the Federal Power Commission adjourned the meeting until Feb. 16, when it will be reconvened in California at a place to be designated later.

Meanwhile Paul Downing, company vice-president, sent to the California division of public works a communication stating that the company means to construct only three of the six dams originally planned. Scheduled for completion before power from the Shasta Dam unit of the Central Valleys Project is ready, these dams would be located at Cresta, Pulga and Poe.

●

Government Files Briefs In Hetch Hetchy Suit

Claiming the sole issue in the case is a question of whether San Francisco's contract with the Pacific Gas and Electric Co. permits the company to act as the city's agent for sale of the power or whether it covers the outright sale of the power, the Federal government last month filed its brief in the Hetch Hetchy power suit pending in Federal court.

One hundred and sixteen previous decisions were cited in support of the government's contention that San Francisco violated the Raker Act when the $2,000,000-a-year contract was signed twelve years ago.

Opening brief of the city, originally scheduled for not later than Nov. 23, will be filed Dec. 9.

●

CONSTRUCTION OF A TRANSMISSION LINE to carry Boulder Dam power to Needles, Calif., was scheduled to start last month upon completion of a survey of the route to be followed. Especially hailed because it will make possible more widespread use of air conditioning, the line will be about 108 mi. long and cost approximately $250,000. Inasmuch as Needles Gas & Electric Co.'s present generating plant will be maintained as a stand-by unit, single poles spaced about nine to the mile will be used. Present plans call for completion of the line by June 1, 1938.

●

CONTRACT FOR WIRING the new Ford Motor Co. of Canada assembly plant now under construction at Burnabay, B. C., has been awarded C. C. Carter, 576 Seymour St., Vancouver, B. C. Expenditure involved is between $50,000 and $60,000.

A. F. of L. Union Withdraws From P. G. & E. Election

Election to determine the collective bargaining agent which will represent Pacific Gas and Electric Co. employees was considerably simplified last month when the International Brotherhood of Electrical Workers, an A.F. of L. affiliate, withdrew its name from the ballot.

No reason was given for the move. Informed persons, however, felt that it was made because the union, numbering only about 500 workers, knew it had no chance and wished to throw its strength behind the independent California Gas & Electric Employees union, the almost positive threat to the CIO affiliate.

Vote, started Dec. 6, is scheduled to end Dec. 14.

SAN DIEGO CONSOLIDATED GAS & ELECTRIC CO. has signed an agreement with the Electrical Workers Local, A. F. of L. affiliate. Extending over a two year period insofar as working conditions are concerned and a one-year period with respect to wages, the agreement contains an arbitration clause guaranteeing the peaceful settlement of any labor trouble.

●

SOUTHERN COLORADO POWER CO.'s new 66,000-volt high line between Pueblo and Rocky Ford was to have been completed early last month. The line, 60 mi. long and costing approximately $230,000, is of standard H-frame construction, with wooden poles and crossarms. Average span of the aluminum conductor used was 625 ft.

●

R. E. A. ACTIVITIES---

OVER-BUILDING TROUBLE on a few projects led REA officials last month to issue a warning to all project managers, engineers and contractors against the danger of over-running allotments in the construction lines.

NEPAGE MCKENNY CO., Seattle, bidding $32,929, submitted the low offer to the Orcas Power & Light Co. for two diesel generating units with a combined capacity of 225 hp.

LOW BID ON THE CONSTRUCTION of the 200-mi. second unit of the Inland Empire Rural electrification project in Whitman County, Wash., has been submitted by Fritz Zebarth, Oakland, Calif. Bid on aluminum was $158,507; on copper, $162,996.

LEWIS COUNTY, Wash., public utility commissioners plan construction of a power distribution system in the Alpha and Randall areas as soon as REA engineers approve plans and specifications for the lines. A $71,000 loan has already been approved by REA and negotiations, looking toward the procuring of energy, are now in progress with Washington Gas & Electric Co., Puget Sound Power & Light Co. and Cowlitz Valley Power Co.

CONTRACT FOR CONSTRUCTION of an 81-mi. rural electrification line in Cowlitz County, Wash., has been awarded to the NePage McKenny Co., Seattle. Work on the project, costing $73,000, was to have started last month.

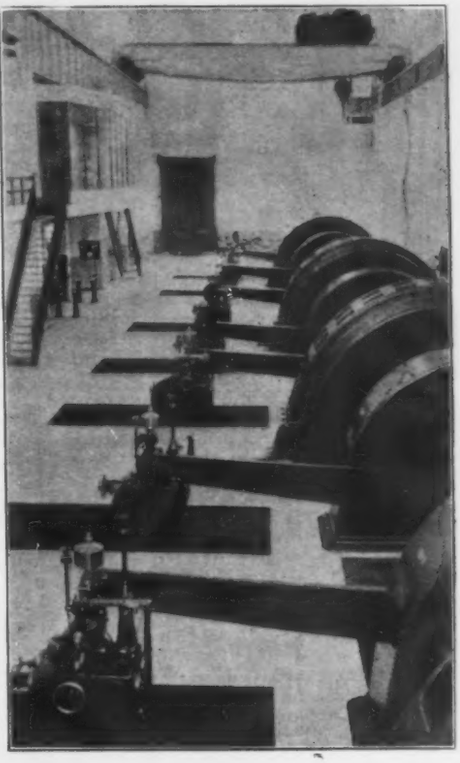
TO FINANCE HOUSE WIRING and plumbing installations for about 40 customers, REA last month allotted $4,000 to the Benton Rural Electric Assn.

PLUMAS-SIERRA RURAL ELECTRIFICATION COOPERATIVE last month received from REA $8,000 for use in making a survey to stake poles. The funds were the first Federal money received by the cooperative.

PUBLIC UTILITY DISTRICT No. 1, Alpha, Wash., has received a $71,000 REA allotment to build 66 mi. of line serving 216 customers in Lewis County. Project is to get power from Puget Sound Power & Light Co. and Washington Gas & Electric Co.

Moccasin Plant Modernized

—after 12 Years of Continuous Operation



Replacement of buckets and needle points in the Moccasin Creek plant was not only a normal maintenance procedure but an opportunity for modernization which, through substantial increase in power output, will return the cost of replacements many times over. Utility engineers may take full advantage of the many improvements in hydraulic turbine design which have been realized in recent years. The older units can be modernized at small cost as worn parts are replaced. Consult with Pelton engineers.

The Pelton Water Wheel Company
HYDRAULIC ENGINEERS

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No. 201 N. E. Klein Side Cutting Plier. "Streamlined" for use in confined spaces.

Good workmen demand good tools. In the hands of men who know — everywhere — the pliers are invariably Kleins. Only the keen, hand-honed, perfectly matched cutting knives of Klein Pliers — only the comfortable spring grip in the Klein handles — only the general all around quality that is an inherent part of every Klein Plier can satisfy men whose work demands the best in tools. This, perhaps, explains why Klein Pliers are the standard of quality by which others are judged — why the name Klein has stood for maximum quality, "since 1857."

DISTRIBUTED THROUGH JOBBERS

Foreign Distributor: International Standard Electric Corp., New York

The four pamphlets listed below will be sent without charge to anyone interested. Check the ones you want:

- ☐ Safety for the Pole Climber.
- ☐ Specifications on Linemen's Belts and Safety Straps.
- ☐ The Safety Factor on Linemen's Leather Goods.
- ☐ Pocket Tool Guide.

Mathias KLEIN & Sons
Established 1857 Chicago, Ill. U.S.A.
3200 BELMONT AVENUE

COMMISSION HEARINGS-

APPLICATION FOR REHEARING of the Arizona Corporation Commission's order affecting valuation for rate-making purposes and consequent drastic rate reductions was sought last month by the Tucson Gas, Electric Light & Power Co. The petition, drawn up by the utility's Tucson attorneys and the Phoenix attorneys of the Central Arizona Light & Power Co., also affected, contested the legality, validity and equity of the order.

HEARING TO RECONSIDER its previous order directing the San Joaquin Light & Power Corp. and the Southern California Edison Co. jointly to compute for each year from 1923 through 1936 the amounts to be paid by the former to the latter for headwater benefits received by San Joaquin's Kerckhoff plant from the Edison company's upstream projects was to be held by the Federal Power Commission Dec. 6.

APPROVAL OF THE ISSUANCE of 35,000 shares of preferred stock and 226,000 shares of common stock by the Sierra Pacific Power Co. for the purpose of consolidating the applicant and its parent company, the Sierra Pacific Electric Co., was granted last month by the Federal Power Commission. Effective date of the merger was set at July 31, 1937.

FEDERAL POWER COMMISION was to hold a hearing Dec. 2 on an application asking approval of the transfer of the license for the Flathead Project, located on Flathead River and Lake, Mont., from the Rocky Mountain Power Co. to the Montana Power Co.

MOUNTAIN STATES POWER CO. stockholders were called to meet Dec. 1 at Wilmington, Del., to vote on a recapitalization plan to take care of maturing $8,182,250 of bonds due Jan. 1, 1938. At the same time the Federal Power Commission held a hearing on the company's application to issue $8,000,000 of 6 per cent first mortgage bonds due Dec. 1, 1942; $700,000 of serial notes, and 69,160 shares of no par value $6 cumulative prior preference stock.

HEARING ON FIXING the power capacity and annual charges of Pacific Gas & Electric Co.'s Project No. 708, located on the Stanislaus River in Calaveras and Tuolumne Counties, was to be held by the Federal Power Commission Dec. 7.

AUTHORIZATION of the San Diego Consolidated Gas & Electric Co.'s sale of electric energy to M. P. Barbachano and Border Telephone & Light Corp., a Mexican utility, for distribution to consumers in the town of Tecate, Mexico, was asked of the Federal Power Commission last month.

●

SCOTT-BUTTNER ELECTRIC CO., Oakland, Calif., submitting the low bid of $52,595, has been awarded the contract for construction of an electric distribution system at the U. S. Army's $7,000,000 air depot near Sacramento.

FOR
- *Lasting Economy*
- *Strength*
- *Safety*

USE LOCUST PINS
Oak Brackets and Pole Steps

LOCUST PIN CO. FRONT ROYAL, VA.

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Los Angeles ★ San Francisco

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- **COST of undisplayed classified ads is 5 cents a word, minimum $1.00 insertion. Box numbers in care of our San Francisco office count as 10 words additional in undisplayed ads.**
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Position Available

Sales Opportunity

Electrical Engineering graduate with 3 to 5 years experience in engineering or operating departments of a Pacific Coast power company; wanted by a manufacturers' sales organization. Will be selling to power companies and industrial plants in the eleven Western states. Considerable traveling required. Will be given short training period at factory before starting out. Real opportunity for right man. Salary open. Write Box 265 Electrical West, 883 Mission St., San Francisco, outlining experience.

PROFESSIONAL SERVICES

ELECTRICAL TESTING LABORATORIES

Electrical Photometrical, Chemical and Mechanical Tests. Inspection of Materials and Apparatus at Manufactory.

80th St. and East End Ave., New York

DRIVING STORMS SWEPT through northern California and Oregon late last month, damaging power facilities and plunging at least one city into darkness. At Benbow, Humboldt County, Calif., swirling waters tore out a portion of a dam, disabling a small power plant. East Medford, Ore., was without lights for a short time when a 35-m.p.h. wind ripped out a power line in Medford.

●

BIDS COVERING LABOR, materials and work on the completion of Grand Coulee Dam, left powerhouse and foundation for pumping plant will be received at the office of the U. S. Bureau of Reclamation, Civic Bldg., Spokane, Wash., until 1 p.m. Dec. 10, at which time they will be opened. Work is specified to start within 30 days after receipt by the contractor of notice to proceed and must be completed within 1,460 days from that date.

●

JOHNS-MANVILLE PRODUCTS CORP. is building a million dollar factory in Watson, a suburb of Los Angeles, for the manufacture of Transite pipe and conduit. The plant will be completed early in 1938.

●

COMPANY EARNINGS

GROSS OPERATING REVENUES of San Diego Consolidated Gas & Electric Co. for the year ending Sept. 30 amounted to $8,159,179 as compared with $7,782,945 for the corresponding period 1936. Net income was $1,393,474, an increase of $89,296 over the preceding year.

SURPLUS EARNINGS of Seattle City Light totaled $715,742 in the first nine months of this year, a gain of 255.77 per cent over the amount for the corresponding period 1936. Total operating revenues were $4.205.737, a 6.35 per cent increase over 1936. Unpaid balance on the department's various bond issues is $38,246,000.

NET INCOME of Pacific Lighting Corp. and subsidiaries for the twelve months ending Sept. 30 was, after deduction of all charges, equivalent to $4.50 a share on the outstanding common stock. This was 49c higher than for the corresponding period 1936. Gross operating revenues for the period totaled $50,095,236 as compared with $50,429,953 for the preceding twelve months.

GROSS OPERATING REVENUE of the Pacific Gas and Electric Co. for the year ending Sept. 30 totaled $99,543,243 as compared with $94,962,772 for the corresponding period 1936. Balance before dividends for 1937 was $25,722,371, $2,000,658 higher than 1936.

When Conditions Demand
Special Designing, BTC
Cooperates with Utility
and Insulator Engineers
The above hardware was produced to specifications by BTC and was recently installed on an important west coast transmission line.
B.T.C. DROP FORGINGS
SOLD THROUGH YOUR INSULATOR MFR. ONLY

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STRAIGHTLINE SPLICES

For

TYPE "A" COPPERWELD WIRE

Specially designed and built to consistently hold approximately the full strength of type "A" conductors.

The Reliable Straightline Splices for Copperweld composite cable are equipped with jaws which grip the wire over a long enough surface to insure consistent holding of this three strand wire with its long lay. These splices retain the outstanding features pioneered in the standard Straightline Splices.

The gripping power of this splice is so great that under test it breaks the wire at approximately its full strength. It makes a good electrical joint, and it is positive in operation.

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OVER 25 YEARS SERVICE TO THE UTILITIES

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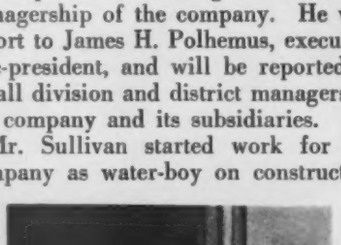
ABOUT PEOPLE

Portland G.E. Names Sullivan General Manager

George E. Sullivan, formerly assistant general sales manager of the Portland General Electric Co., was last month promoted to the general division managership of the company. He will report to James H. Polhemus, executive vice-president, and will be reported to by all division and district managers of the company and its subsidiaries.

Mr. Sullivan started work for the company as water-boy on construction



GEORGE E. SULLIVAN

projects several years before he got his M.S. degree at the University of Oregon in 1911. On leaving college, he was employed in the construction of the company's River Mill plant and later in drafting and designing in the engineering department. From this position he worked up through meter reading, collecting and selling work to the district managership at Oregon City, division sales managership at Portland and in 1935 to the assistant general sales managership.

●

F. O. McMillan Named Head of O.S.C. Electrical Engineering

F. O. McMillan, Oregon State College professor of electrical engineering since 1920, last month became head of the Electrical Engineering Department. He succeeded R. H. Dearborn, new dean of the engineering school.

Professor McMillan is past regional vice-president of the A.I.E.E. and has been an active worker on committees of the Engineering and Operating Section, Northwest Electric Light & Power Assn. In the latter connection he conducted experiments on electric fish screens and on insulators. He developed an asphaltic emulsion for coating pin-type insulators to reduce or eliminate the interference produced by old type insulators.

Underground Transmission

Without Conduit

Note the air and moisture proof flexible coverings. Sealtite represents a distinct advance in parkway cable construction. It is more pliable than any other underground cable . . . and costs are considerably lower.

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In using these units countless housewives have discovered the speed and saving of contact cooking, and the cleanliness of the flat top unit. Now standard equipment on a number of ranges because of their popularity and long life without service troubles. Ideal for replacement, too. They fit all ranges.

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R. M. E. L. Committee Chairman Appointed

Appointment of new committees highlighted the special two-day session at which Rocky Mountain Electrical League officials last month laid the groundwork for an expanded program of activities in 1938.

Steering committee, announced by President Guy W. Faller and President-elect J. H. Jacobucci, will be composed of W. N. Clark, president of the Southern Colorado Power Co.; Ross H. Adams, J. E. Loiseau, O. A. Weller and G. B. Buck.

Mr. Clark was also appointed chairman of the utilities committee and chairman of the sales and promotional section, one of the most important posts in Mr. Jacobucci's cabinet. Mr. Buck was named vice-chairman of the latter committee.

Others who will comprise the president-elect's cabinet are: L. M. Robertson, engineering; Harry Adler, accounting; H. A. Fluckey, distributors; A. L. Jones, manufacturers; Herb Names, retailers; R. Y. Chedister, contractors, and F. R. Jamison, advertising and publicity. Chairmen of various sub-committees will be announced later.

●

F. B. Williams, Jr., vice-president and sales manager of Diehl Manufacturing Co., has returned to Elizabethport, N. J., after a visit on the Pacific Coast during which he arranged for manufacture of Diehl motors in Seattle. Parts will be shipped from the East and assembled in that city for Pacific Coast distribution.

●

National Safety Council announces among the new officers elected at its Kansas City convention, S. C. Dickenson, Pacific Gas and Electric Co. as a member of the News Letter committee, and R. A. Edwards, San Diego Consolidated Gas & Electric Co., as a member of the Membership committee of the Public Utilities Section.

●

Dean and Chamberlain To Represent Kelvinator

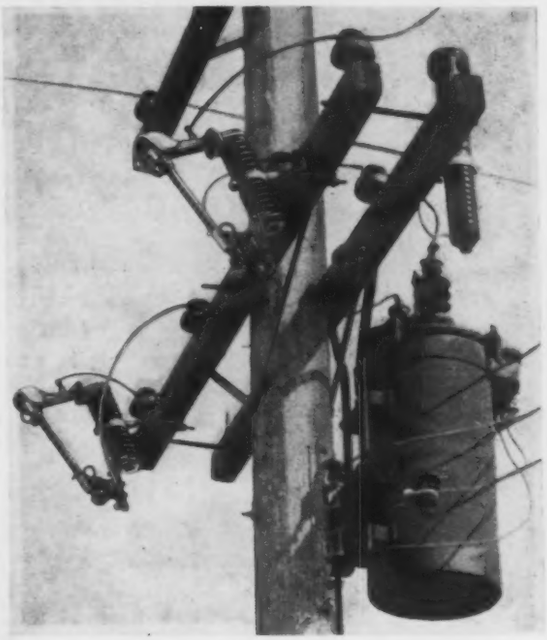
E. N. Dean and E. H. Chamberlain were last month appointed Kelvinator commercial representatives to work under A. H. Reinach, new Western division manager of the company. Mr. Dean was formerly Kelvinator commercial representative in the East Central division; Mr. Chamberlain was commercial refrigeration sales manager for the Modern Utilities Co., Helena, Mont., Kelvinator distributor.

Roy Conrad, for the past year connected with the company's Western region as engineer, will continue in the same capacity.

Better System Protection

With Reduced Maintenance Costs

S & C Semafor Cutouts and Fuse Links are being installed with increasing regularity, because they reduce maintenance costs on distribution circuits—saving in many cases thousands of dollars in preventing line troubles and transformer burn-outs.



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CUTOUTS

Truly S & C in Design and Dependability

In the design of S & C Semafor Cutouts and Links is embodied S & C's long experience in circuit interrupting equipment field. The characteristics and design features of the S & C Fuse Links used are similar to those of the S & C Liquid Fuse, with which all power engineers are well acquainted.

S & C Semafor Cutouts are made in 50 and 100 amp. capacities in light and medium duty types up to 23,000 Volts and heavy duty to 46,000 Volts. Circuit interrupting process is completed inside the tube before upper contact is disengaged.

Unnecessary outages are prevented—fewer links to replace—unnecessary service trips are saved—S & C Semafor Cutouts and Fuse Links are paying for themselves on lines in every part of the country. . . . Get bulletin 215-A which contains all the data on both open and enclosed types and Reclosing Fuses.

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However you figure it . . . Gardner Transformers will save you money. Their reasonable initial cost, low maintenance cost, long life and ever reliable service adds up to real economy. That is why the Red River Lumber Company purchased Gardner Transformers. And that is why it will pay you to call our nearest representative TODAY.

Destined for dependable and economical Service . . . these 3—1000 kva. Gardner Transformers of 2300—460/230 volt capacity, shown at the left, were shipped to the Red River Lumber Co., Westwood, Calif.

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CAPACITORS
- CORNELL-DUBILIER CORP. *World's Largest Exclusive Mfrs. of Capacitors*

Thatcher Ends 38-Year Service With Puget Sound

Reno E. Thatcher, assistant engineer in the central district office of the Puget Sound Power & Light Co., resigned last month after 38 years of active service in the utility field.

Starting work for the Washington Water Power Co. in 1899 as meter tester, Mr. Thatcher in 1901 joined the force of the Puget Sound company. From that date he worked up through various positions, from meter foreman to service superintendent and, two years ago, to assistant engineer.

Once winner of the senior golf championship of the State of Washington, he for years was permanent golf chairman of the Electric Club of Washington.

●

BERT R. DELERAY

BERT R. DELERAY was last month appointed Westinghouse Electric & Mfg. Co.'s Los Angeles manager to fill the vacancy caused by the sudden death of Clarence E. Thompson. Connected with the company's lamp division since 1926, Mr. Deleray assisted Mr. Thompson in the Los Angeles territory for the past ten years.

●

EDWARD A. WEST, vice-president and general manager of the Florida Power & Light Co., last month became general manager of the Denver, Rio Grande & Western R. R. Mr. West will be located in Denver. He was formerly vice-president and general manager of the Utah Light & Traction Co.

●

W. H. MCBRYDE, San Francisco consulting engineer, and F. H. Prouty of Prouty Bros. Engineering Co., Denver, will take up their new duties as officers of the American Society of Mechanical Engineers Dec. 10. Mr. McBryde was recently elected vice-president; Mr. Prouty, manager.

FRANK KIEFER, field manager, Pacific Coast Electrical Bureau, talked to the Pacific Service Employees Assn., meeting recently at Monterey and Salinas, on the necessity for support of the industry's adequate wiring program.

●

President of L. A. Water, Power Board Dies

Dr. J. R. Hayes, president of the Los Angeles Board of Water and Power Commissioners, died at a Los Angeles hospital Oct. 30 after a month's illness. He was 84. Coming to Los Angeles from Philadelphia in 1887, he practiced medicine for 30 years, then retired to devote all his time to public and civic life. His chief public interest was the promoton of municipal ownership.

Succeeding Dr. Haynes as president of the board of commissioners is Arthur J. Mullen, attorney who has been a member of the board since 1933.

●

GEORGE R. MCLEAN, superintendent of the B. C. Electric Railway Co.'s power plant at Ruskin, B. C., since it was completed in 1930. died recently after a brief illness. He was 58. Entering the company's service as a machinist in the old Prior St. shop at Vancouver, he had been connected with the company for 27 years.

●

John S. McIlwaine, Arizona Electrical Engineer, Dies

John S. McIlwaine, electrical engineer associated with the Salt River Valley Water Users Assn. for the past ten years, died Oct. 22 after a five months' illness. He was 66.

Coming to Arizona in 1905, Mr. McIlwaine was connected with several organizations in addition to the water users association. These included the Standard Oil Co. and the Federal Bureau of Reclamation, for which he directed construction of the powerhouse at Roosevelt Dam. He also was instrumental in bringing power lines into the Salt River valley.

●

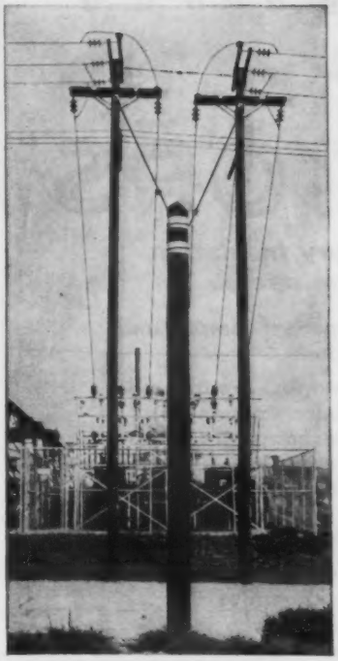
GEORGE J. SCHWALL, electrical inspector of Stockton, Calif., an active member of the Southwestern Section, I.A.I., died Oct. 2, following an operation for appendicitis. The city council appointed Harry C. Henceman, a deputy inspector, to succeed Mr. Schwall as city electrician.

●

FRANK H. EARDLEY, Salt Lake City electrical contractor, died last month at the age of 56. Engaged in the electrical business since 1909, he was for the past five years manager of Eardley's Electric Shop.

Crapo GALVANIZED PRODUCTS

INDIANA STEEL & WIRE CO. Crapo Galvanized MUNCIE, IND.



Specified for Most Important Jobs

Crapo Galvanized Steel Strand has earned its reputation for longer life and lower maintenance cost by outstanding performances in actual service over a period of years.

It constantly is being specified for the most important construction jobs because of its ability to more than meet every requirement for strength, ductility and resistance to corrosion.

Crapo Galvanized Steel Strand and Wire is available in all standard grades and sizes.

Indiana Steel & Wire Company
Muncie, Indiana

(Left) New lines erected by Department of Water and Power, City of Los Angeles, and guyed with *Crapo* Galvanized Steel Strand.

Steel Strand

• • •

Telephone and Telegraph Wire

A NEW
ROCK ANCHOR

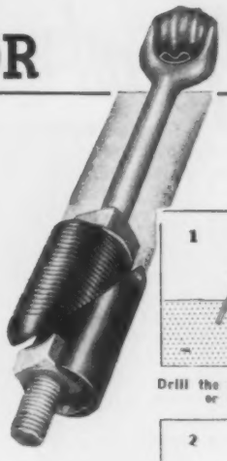
NO MORE LEAD OR CONCRETE

Here's a new rock anchor that has created a lot of enthusiasm wherever it has been shown or demonstrated because it does the job easier, better and more economically than anything ever used for anchoring in solid rock. It's installation is simple (see illustrations 1, 2 and 3). No heating lead or mixing concrete is necessary.

The expanding action wedges the anchor into the hole. Tests prove it will do the job.

Ask the Chance man or your jobber's salesman for a demonstration, or write for details. You'll be enthusiastic, too.

DISTRIBUTED BY G. E. SUPPLY CORP.



Drill the hole by hand or power.

Drop anchor into hole.

Expand anchor by turning rod. Large eye admits bar for wrench.

A·B·CHANCE CO. Utilities Division
CENTRALIA MISSOURI

HEMINGRAY Glass INSULATORS

for primary and secondary insulation service and rural line needs.

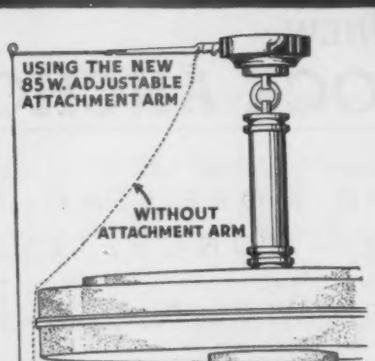
Brass-bushed for great strength, perfect threads and full protection against pin expansion.

Hemingray provides many advantages: greater mechanical strength . . . sustained dielectric strength . . . unaffected by sudden temperature changes . . . withstands maximum insulator pin expansion . . . never ages or deteriorates . . . all surfaces impervious to moisture . . . tougher—withstands rough handling . . . clear and flawless for easy inspection.

Available in all styles . . . clear or brown glass . . . ratings up to 15,000 volts. Write for samples.
Owens-Illinois Glass Company . . . Muncie, Indiana.

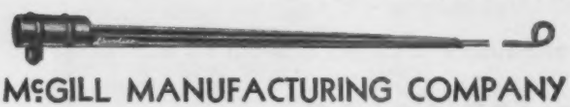
New!

Every fixture with a wide bowl and lamp cord needs the McGILL Extension Arm. Slipped over the Levolier Switch lever and tightened, the arm prevents wear and possible breaking of cord and bowl, and eliminates strain on the fixture. It is an added economy and adds to the life of the switches. Order from your wholesaler.



Made of metal 1/32-inch thick, and formed for additional strength and rigidity. Closed, 5¼ inches. Extends up to 9½ inches.

McGILL *Levolier*
Extension Arm (No. 85W.)



McGILL MANUFACTURING COMPANY
Electrical Specialties of Quality
VALPARAISO, IND.
Box No. 604

TRADE NOTES

NEW GENERAL ELECTRIC BUILDING in Los Angeles was formally opened Nov. 29. Included in the building are the district office and warehouse, appliance and merchandise department and the G.E. Contracts Corp. of the General Electric Co. and the offices and warehouse of the General Electric Supply Corp. Address of the company is 212 N. Vignes St.; of the supply corporation, 700 Turner St. The G.E. service shop will remain at its present address.

●

STANDARD ELECTRIC CO., 1236 Seymour St., Vancouver, B. C., has changed its name to the Longley Electric Co., Ltd. The firm, which is under the direction of Charles Longley, one of the charter members of the Vancouver Electrical Assn., will continue at its old address.

●

REA-GALLUP CO., 253 S. Western Ave., Los Angeles, is a newly organized firm specializing in the planning and equipping of complete electric kitchens.

●

PORTLAND METAL SPECIALTIES CO., 3721 S. E. Hawthorne Blvd., Portland, has added the Fairbanks-Morse refrigerator to its line.

●

ELECTRIC SUPPLIES DISTRIBUTING CO., San Diego, Calif., held open house Nov. 18-20 to celebrate the opening of the enlarged warehouse, complete displays and improved facilities made possible by a recent addition to the building.

●

RECENTLY INCORPORATED at Victoria, B. C., was the Lake Cowichan Electric Co. with registered offices c/o Gordon's Store, Lake Cowichan, B. C. Authorized capital of the firm is set at $10,000.

●

THREE NEW ELECTRICAL APPLIANCE stores blossomed out in Portland recently. They are: Elrad Service & Sales Co., 4821 S. E. Hawthorne Blvd.; Holman & Card, 7005 S. E. 82nd Ave., and Consolidated Radio & Refrigerator Service Co., 6517 N. Interstate Ave.

●

WILLETT ELECTRIC has opened a retail electrical appliance store at 1030 Cook St., Victoria, B. C.

●

ROME WIRE & CABLE CO. has established a Los Angeles office and warehouse at 327 E. Fourth St. F. R. Weaver is in charge.

●

ITANO BROS. is a new appliance and radio store operated by Roy and Joe Itano at 1400 W. Jefferson Blvd., Los Angeles.

OKONITE CO. has completed a new two-reel sound film showing how rubber insulated wires and cables are made and used. Lowell Thomas is the narrator. The film will be shown without charge to those interested.

●

BYERLY & ARMSTRONG, Portland electrical dealers, have added the General Electric radio to their line of appliances.

●

WILLIAM L. PILLSBURY'S radio repair shop, 6013 S. E. 92nd Ave., Portland, now carries a full line of electrical appliances.

●

TWENTY-FIFTH ANNIVERSARY of its founding was recently celebrated by Brettell, Ltd., electrical wholesalers located at 541 Howe St., Vancouver, B. C. Entirely Vancouver owned, the firm is in the charge of Eric Brettell, managing director, assisted by Jack Churchland and George J. Watt.

●

MOVED

C. P. WILLIAMS, General Electric and Westinghouse dealer, to new store on Main St., Ashton, Ida.

CASTLETON APPLIANCE CO. and Lee Variety Store, both of Eureka, Utah, to larger quarters.

GENERAL OFFICES AND WAREHOUSE of the Christiansen Furniture Co. from Richfield, Utah, where the first of the company's four stores was located, to Salt Lake City.

GENERAL ELECTRIC SUPPLY CO.'s branch house in San Diego to new and larger quarters at 205 W. Market St.

EVANS ELECTRIC CO., Salinas, across the street.

HOLLYWOOD WHOLESALE ELECTRIC CO. from 1000 N. Highland Ave., Hollywood, Calif., to new building incorporating several unique features at 6820 Romaine St.

HERBERT A. CORDES, General Electric Co. representative in San Diego, from 206 W. Market St., to 806 Electric Bldg.

J. P. ROBINSON, representing Kerite Insulated Wire & Cable Co., from 418 Matson Bldg. to 905 Hobart Bldg., San Francisco.

LOWENTHAL ELECTRIC CO. moved from 123 E. Alviendo to 105 Broadway, Pueblo, Colo.

THOR PACIFIC CO. from 715 Bryant St. to larger quarters at 730 Bryant, San Francisco.

Z. ALVIN GOFF, wholesaler of Electrical supplies and auto supplies moved from 126 S. 4th St., to 459 State St., El Centro, Calif.

BEVERLY HILLS ELECTRIC CO., operated by Gil Tozer and John L. Smith, from 9493 Santa Monica Blvd. to larger quarters at 435 Beverly Drive, Beverly Hills, Calif.

MOHRDICK ELECTRIC CO. from 439 Clementina St. to 947 Folsom St., San Francisco.

PLAYS SAFE

To see for himself how we would manage his family's affairs, he is testing the operation of a part of his estate under a Living Trust.

TRUST DEPARTMENT

CROCKER FIRST NATIONAL BANK of San Francisco

New nut housing. Locks Anchor firmly on rod. Rod cannot slip thru Anchor when being installed.

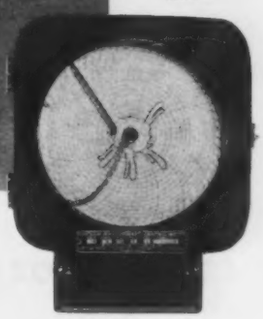
EVERSTICK ANCHORS...

Engineers appreciate Everstick features which assure safety, long life and ease of installation in any soil condition. A complete line of 3 types of expanding Anchors and rigid types of Cone Anchors. All sizes and holding capacities. Write for Everstick literature including new folder on Rural Electrification Lines.

EVERSTICK ANCHOR CO.
FAIRFIELD, IOWA

LINCOLN DEMAND METERS

THE correct PRINCIPLE

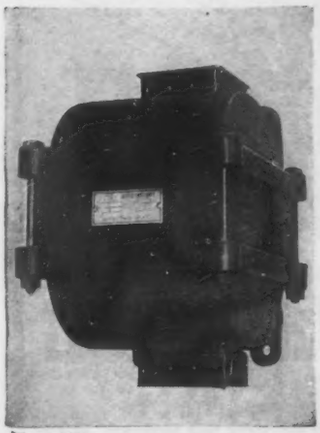


Type CCW Graphic Demand Meter

The capacity of generation and distribution equipment is directly related to the heating effect of the load imposed. Likewise the registration of the Lincoln Maximum Demand Meter depends upon the heating effect of the load.

LINCOLN METER COMPANY
SPRINGFIELD, ILLINOIS

YOU SAVE



With JEFFRIES

AIR COOLED **TRANSFORMERS**

● With a Jeffries Air Cooled Transformer money can be saved. The Air Cooled construction lengthens the life of the transformer and lowers repair costs. Plant expansion and extension can be made economically for a Jeffries Transformer provides the voltage change at the point desired without the need of long and expensive conduit runs. Besides a complete line of standard transformers, special designs and voltage furnished to order. Type S. S. Transformer 1 to 5 K. V. A. illustrated.

JEFFRIES TRANSFORMER COMPANY
5706 LONG BEACH AVE., LOS ANGELES

MAYDWELL

Glass Insulators

All Standard Numbers For All Purposes

Made of high quality materials in a modern Pacific Coast plant producing an unusually tough glass to withstand all severe service conditions.

MAYDWELL & HARTZELL
INCORPORATED
Electrical Engineers and Manufacturers' Representatives
Los Angeles ★ San Francisco

PRODUCT DATA

1201:
STATION POST INSULATORS, complete cataloguing data including standard NEMA ratings from 7.5 kv. to 138 kv. etc. Lapp Insulator Co., Inc.

1202:
STANDARD WIRING DEVICES, catalogue containing listings of 2,100 items. Bryant Electric Co.

1203:
CONSTANT-CURRENT TRANSFORMERS, described, illustrated and specified. General Electric Co.

1204:
LIGHTING EQUIPMENT, 352-page catalogue of data on latest improvements and developments in industrial lighting, flood lighting and signals. Benjamin Electric Mfg. Co.

Free to you . . . Any of these instructive bulletins . . . Address a post card to ELECTRICAL WEST 883 Mission St., San Francisco, Calif. . . . drop it in the next mail.

1205:
CIRCULAR COIL SHELL TYPE TRANSFORMERS, described and illustrated. Allis-Chalmers Mfg. Co.

1206:
CENTRIFUGAL PUMPS, type CF suitable for handling capacities from 10 g.p.m. to 300 g.p.m., described and illustrated. Worthington Pump & Machinery Corp.

1207:
FACTS TO CONSUMERS, booklet briefly describing and illustrating work of Electrical Testing Laboratories.

1208:
MACHINING ALUMINUM, revised edition of booklet containing information on the machining of aluminum and its alloys. Illustrations, diagrams and specifications. Aluminum Company of America.

1209:
SPORT FIELD FLOODLIGHTING, 48-page booklet giving illustrations, diagrams of installations, coverage and light distribution charts. Benjamin Electric Mfg. Co.

1210:
ELECTRICAL PRODUCTS, corrected catalogue. Colt's Patent Fire Arms Mfg. Co.

1211:
METAL SPRAY GUNS described briefly; new applications given. Metalspray Co., Inc.

1212:
RURAL LINE CONSTRUCTION MATERIAL, catalogue of diagrams, illustrations, applications. Line Material Co.

1213:
TRANSFORMERS, 13 types, illustrated and briefly described. R. E. Uptegraff Mfg. Co.

1216
WATTHOUR METERS; pamphlet composed of all bulletins dealing with various types of meters. General Electric Co.

1214:
TYPE HAE RURAL LINE TRANSFORMERS for use on systems having solidly grounded neutral common to both primary and secondary circuits described. Allis-Chalmers Mfg. Co.

1215:
PYRANOL CAPACITORS; application, installation, construction, etc., detailed. General Electric Co.

NEW PRODUCTS

Improved Insulator

Introduced by Ohio Brass Co. is a new type of suspension insulator, called Smogtype, designed to withstand fog or contaminating influences. Distinctive are its 17-in. leakage distance, wide spacing of petticoats exposed to weather, metallized inner petticoat for flux control, recessed cement matrix between porcelain and pin, coupling to protect cap against water dripping from unit above. Quoted are flashover values of 105 kv. dry, 55 kv. wet; arcing distance 9.6 in. dry, 4.7 in. wet. Shell diam. is 10 in. with a 4-in. droop.

●

Fractional Horse-power Motors

New line of fractional horse-power motors in sizes from 1/6 to ¾ h.p. has been announced by the Century Electric Co. The line, including various types of motors, is designed with interchangeable mounting dimensions for a given horse-power size.

●

Desk Lamp

A patented rotor arm by means of which the lamp can be turned to any angle without danger of hurting the cord features the new desk-type lamp introduced by the Miller Co. Light is diffused and reflected by an inner glass bowl. No clamps are necessary to hold the lamp upright.

●

Treadle Station

For installations where an operator must have both hands free while starting or stopping his machine, General Electric has developed a new treadle-operated, watertight push-button station especially suitable for use in damp or wet locations. The station is available either with a single or double action automatic treadle so designed that the operator can push as hard as he wants without endangering the electrical parts of the device.

●

Extension Arm

Extension arm for use with the McGill Manufacturing Co.'s Levolier switches has been improved by addition of a sliding rod which permits lengthening of the arm by several inches. Adapted to the new-style, wide-basined fixtures, the arm eliminates cord wear and prevents fixture from swaying.

●

Wire Stripper

Automatic wire hand strippers designed to strip solid wire from 8 gage down to 30 gage or stranded lamp and fixture wire has been announced by Pyramid Products Co. The device comes in four sizes, the one for small gage wire having six stripping holes; for medium wire, three stripping holes, and for large wire, two stripping holes.

●

Relay With Voltage Restraint

Announced by General Electric Co. is the type CBP polyphase power directional relay. It has two "cup-type" torque-producing elements on one shaft. One element is a polyphase power directional element; the other is a voltage restraint element, giving a directional relay which normally stays in the open position. On a fault, the voltage restraint collapses, allowing the directional element full control.

●

Network Analyzer

Placed in operation at G.E. Co.'s Schenectady Works is an a.c. network analyzer which can be used for load and voltage-regulation studies, investigations in system stability, and network studies involving mutual reactance.

It consists of a central metering and main control cabinet, two centrally located plugging cabinets, and eight cabinets containing the impedances used in setting up the network. Source of power is a 480-cycle motor-generator set. Direct measurements can be taken of current, voltage, power, reactive power, phase angle and vector component of current and voltage at any given point in the network.

High Speed Pilot Relay

A new type of pilot relay for use in conjunction with carrier current or wired pilot channel will operate and trip out faults in from 1 to 3 cycles at system frequency. The new relay is selective in operation and is independent of the length of protected line and not affected by tapping of the line. These characteristics eliminate costly application studies and permit the most economical design and operation of the system without regard to its protection. The relay consists of a number of separate units mounted in a 16x20-in. case, completely wired and coordinated in the factory and is ready for immediate service. It is so constructed that it is immune to system swings or out-of-step conditions. General Electric Co., Schenectady, N. Y.

WHERE TO BUY IN THE WEST

G.C.A.
Lamp Replacers
Lamp base Removers
Cartridge Fuse Tongs
Switch Hooks

Send for Catalogue

We have been making safety tools for 20 years

The G. C. A. Manufacturing Co.
Pittsfield, Mass.

Air Conditioning
Frigidaire Corp.
General Elec. Co.
Graybar Elec. Co., Inc.
Kelvinator Corp.
Norge Division, Borg-Warner Corp.

Ammeters and Voltmeters
Ferranti Elec., Inc.
General Elec. Co.
Roller-Smith Co.
Westinghouse Elec. & Mfg. Co.
Weston Elec. Instr. Corp.

Anchors, Guy
A. B. Chance Co.
Everstick Anchor Co.
Hubbard & Co.
James R. Kearney Corp.
W. N. Matthews Corp.

Anchor and Guy Rods
A. B. Chance Co.
General Elec. Co.
Hubbard & Co.
Maydwell & Hartzell, Inc.

Appliances, Household
Chicago Flexible Shaft Co.
Easy Washing Machine Corp.
Edison Gen. Elec. Appliance Co., Inc.
Frigidaire Division
General Elec. Co.
General Elec. Supply Corp.
Graybar Elec. Co., Inc.
Kelvinator Division
Leonard Division
National Enameling & Stamping Co.
Noblitt-Sparks Industries, Inc.
Norge Division
Standard Elec. Stove Co.
The Silex Co.
Utility Electric Co.
Thermador Elec'l Mfg. Co.
Wesix Elec. Heater Co.
Westinghouse Elec. Supply Co.
The Woolwine-Norris Corp.

Boxes
General Cable Corp.
General Elec. Co.
Superior Switchboard & Devices Co.

Brackets, Wood
Locust Pin Co.

Breakers
Air Circuit Breakers
Electric Material Co.
General Elec. Co.
I-T-E Circuit Breaker Co.
Roller-Smith Co.
Sangamo Elec. Co.
Westinghouse Elec. & Mfg. Co.
Oil Circuit Breakers
Allis-Chalmers Mfg. Co.
Electric Material Co.
General Elec. Co.
Pacific Elec. Mfg. Corp.
Roller-Smith Co.
Westinghouse Elec. & Mfg. Co.
Line Material Co.
Pacific Elec Mfg. Corp.

Bus Fittings
Burndy Eng'g Co.
General Elec. Co.

Buses
Aluminum Co. of America

Cable Accessories
General Cable Corp.
General Elec. Co.
John A. Roebling's Sons Co.

Cables
Aluminum Co. of America
American Steel & Wire Co.
Columbia Steel Co.
Crescent Ins. Wire & Cable Co.
Crucible Steel Co. of America
General Cable Corp.
General Elec. Co.
Graybar Elec. Co., Inc.
Hazard Ins. Wire Works
Indiana Steel & Wire Co.
Maydwell & Hartzell, Inc.
The Okonite Co.
Okonite-Callender Cable Co.
Providence Insulated Wire Co.
Rockbestos Products Corp.
John A. Roebling's Sons Co.
Triangle Conduit & Cable Co., Inc.
United States Steel Corp.
Westinghouse Elec. & Mfg. Co.

Carbon Brushes
National Carbon Co., Inc.

Carbon Products
National Carbon Co., Inc.

Chimes
Square D Co.

Clamps, Ground
B. Hartman
Reliable Elec. Co.

Clocks, Program
Tork Clock Co., Inc.

Coffee Makers
The Silex Co.

Coil Winding
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Commutator Dressers
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Clifton Mfg. Co.
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General Cable Corp.
General Elec. Co.
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General Elec. Co.
Westinghouse Elec. & Mfg. Co.

Conduit
Aluminum Co. of America
General Elec. Co.
Triangle Conduit & Cable Co., Inc.
Youngstown Sheet & Tube Co.

Conduit, Flexible Metallic
General Elec. Co.
Triangle Conduit & Cable Co., Inc.
Wiremold Co.

Conduit, Underground
Johns-Manville Corp.

Connectors
Burndy Eng'g Co.
Electric Power Equip. Corp.
G & W Elec. Specialty Co.
James R. Kearney Corp.
W. N. Matthews Corp.
Reliable Elec. Co.
L. W. Thompson

Controllers
Allis-Chalmers Mfg. Co.
Betts & Betts Corp.
General Elec. Co.
Square D Co.
Westinghouse Elec. & Mfg. Co.

Cutouts
G & W Elec. Specialty Co.
General Elec. Co.
James R. Kearney Corp.
Line Material Co.
W. N. Matthews Corp.
Schweitzer & Conrad, Inc.
Westinghouse Elec. & Mfg. Co.

Demand Control
General Elec. Co.
Wesix, Inc.

Distribution Specialties
G & W Elec. Specialty Co.
General Elec. Co.
Hubbard & Co.
James R. Kearney Corp.
Maydwell & Hartzell, Inc.
St. Louis Malleable Casting Co.
Superior Switchboard & Devices Co.

Electrodes, Arc Welding
General Elec. Co.
John A. Roebling's Sons Co.

Enclosures, Meter and Instrument
Superior Switchboard & Devices Co.

Fans
General Elec. Co.
Kisco Co., Inc.
Smallcomb Elec. Co.

Farm Electrification Equipment
General Elec. Co.

Fittings, Conduit
General Elec. Co.
B. Hartman
Killark Elec. Mfg. Co.

Fittings, Insulator
Brewer-Titchener Corp.

Fixtures, Lighting
Benjamin Elec. Mfg. Co.
Curtis Lighting, Inc.
General Elec. Co.
Pittsburgh Reflector Co.
Smoot-Holman Co.
Westinghouse Elec. & Mfg. Co.

Floodlighting
Curtis Lighting, Inc.
General Elec. Co.
Pittsburgh Reflector Co.
S & M Lamp Co., Inc.
Smoot-Holman Co.
Westinghouse Elec. & Mfg. Co.

Generators
Allis-Chalmers Mfg. Co.
General Elec Co.
Westinghouse Elec. & Mfg. Co.

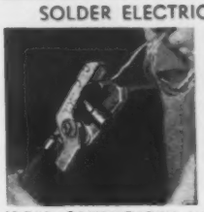
Graphite Products
National Carbon Co., Inc.

Ground Rods
Maydwell & Hartzell, Inc.

Heaters, Air
Edison Gen. Elec. Appliance Co.
Noblitt-Sparks Industries, Inc.
Thermador Elec'l Mfg. Co.
Wesix Elec. Heater Co.
Edw. L. Wiegand Co.

Heaters, Water
Edison Gen. Elec. Appliance Co.
Electro Hot Heater Co.
Standard Elec. Stove Co.

SOLDER ELECTRICALLY



IDEAL THERMO-GRIP PLIERS heat and grip two sides at once. Usable in cramped places in any position. Save time and money. SAFE.

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Thermador Elec'l Mfg. Co.
Wesix Elec. Heater Co.
Westinghouse Elec. & Mfg. Co.
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Heating Element—Repair Part
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Instruments, Measuring and Recording
See Ammeters, Voltmeters, Wattmeters.

Insulation
General Elec. Co.
Irvington Varnish & Insulator Co.
Johns-Manville Corp.

Insulators
Brewer-Titchener Corp.
Corning Glass Works
Graybar Elec. Co., Inc.
Hemingray Glass Co.
Geo. E. Honn Co.
Lapp Insulator Co., Inc.
Locke Insulator Corp.
Maydwell & Hartzell, Inc.
Owens-Illinois Glass Co.
Westinghouse Elec. & Mfg. Co.

Ironers
Easy Washing Machine Corp.
Edison Gen. Elec. Appliance Co.
General Elec. Co.
Norge Division, Borg-Warner Corp.
Westinghouse Elec. & Mfg. Co.

Knobs, Tubes, Cleats
Standard Elec'l Porcelain Mfrs.

Lamp Guards
McGill Mfg. Co.

Lamp Replacers
G. C. A. Mfg. Co.

Lamps, I. E. S.
General Elec. Co.

Lamps, Mazda
General Elec. Co.
Westinghouse Lamp Co.

Lamps, Sun
General Elec Co.

Lighting Equipment
Benjamin Elec. Mfg. Co.
Curtis Lighting, Inc.
Kim Mfg. Co.
Smoot-Holman Co.
Westinghouse Elec. & Mfg. Co.
Wuelker Lighting Co.

Line Material
Maydwell & Hartzell, Inc.

Meters
General Elec. Co.
Lincoln Meter Co.
L. A. Nott
Sangamo Elec. Co.
Westinghouse Elec. & Mfg. Co.
Weston Elec'l Instrument Corp.

Motors
Allis-Chalmers Mfg. Co.
General Elec. Co.
Westinghouse Elec. & Mfg. Co.

Motor Starters
Allis-Chalmers Mfg. Co.
General Elec. Co.
Square D Co.
Westinghouse Elec. & Mfg. Co.

Oil, Lubricating
Shell Oil Co.
The Texas Co.

Oil, Transformer & Switch
General Elec. Co.
Shell Oil Co.
The Texas Co.

Panel Boards
General Elec. Co.
Square D Co.
Superior Switchboard & Devices Co
Westinghouse Elec. & Mfg. Co.

Photoelectric Cells
General Elec. Co.
Weston Elec'l Instrument Corp.

Pins, Wood
Locust Pin Co.

Pole Line Hardware
Brewer-Titchener Corp.
General Electric Supply Corp.
Graybar Electric Co., Inc.
Hubbard & Company
Joslyn Co. of California
Kortick Mfg. Co.
Maydwell & Hartzell, Inc.

Porcelain
Standard Elec. Porcelain Mfrs.

Public Utilities
California Oregon Power Co.
Idaho Power Co.
Mountain States Power Co.
Northwestern Electric Co.
Pacific Gas and Electric Co.
Pacific Power & Light Co.
Portland General Electric Co.
Puget Sound Power & Light Co.
San Diego Cons. Gas & Elec. Co.
San Joaquin Light & Power Corp.
Southern California Edison Co. Ltd.
Utah Power & Light Co.
Washington Water Power Co.

Pullers, Slack
A. B. Chance Co.

Pumps
Pelton Water Wheel Co.

Range Units
Edison Gen. Elec. Appliance Co.
Edwin L. Wiegand Co.

Ranges
Edison Gen. Elec. Appliance Co.
General Elec. Co.
General Elec. Supply Corp.
Kelvinator Corp.
Norge Division, Borg-Warner Corp.
Standard Elec. Stove Co.
Westinghouse Elec. & Mfg. Co.
The Woolwine-Norris Corp.

Reflectors
Benjamin Elec. & Mfg. Co.
Curtis Lighting, Inc.
Pittsburgh Reflector Co.
Reflector & Illuminating Co.
Smoot-Holman Co.
Westinghouse Elec & Mfg. Co.
Wuelker Lighting Co.

Refrigerators
Edison Gen. Elec. Appliance Co.
Frigidaire Corp.
General Elec. Co.
General Elec. Supply Corp.
Graybar Elec. Co., Inc.
Kelvinator Corp.
Leonard Refrigerator Co.
Norge Division, Borg-Warner Corp.
Westinghouse Elec. & Mfg. Co.

Relays
General Elec. Co.
Roller-Smith Co.
Square D Co.
Ward Leonard

Rheostats & Resistors
General Elec. Co.
Westinghouse Elec. & Mfg. Co.

Roasters
National Enameling & Stamping Co.
Westinghouse Elec. & Mfg. Co.

Rural Line Hardware
General Elec. Supply Corp.
Graybar Elec. Co., Inc.
Hubbard & Co.
Joslyn Co. of Calif.
Kortick Mfg. Co.
Maydwell & Hartzell, Inc.

Service Organizations
Crocker First National Bank
Elec'l Testing Labs.
McGraw-Hill Book Co.
Northwest Elec. Light & Power Association
Pacific Coast Elec'l Bureau
Pacific Coast Elec'l Ass'n

Strand, Guy
Maydwell & Hartzell, Inc.
Pacific Wire Rope Co.

Street Lighting Fixtures
General Elec. Co.
Graybar Elec. Co., Inc.
Hubbard & Co.
Line Material Co.
Westinghouse Elec. & Mfg. Co.

Switchboards
Allis-Chalmers Mfg. Co.
General Elec. Co.
Roller-Smith Co.
Square D Co.

Switches, Disconnect
Electric Power Equip. Corp.
General Elec. Co.
Kearney Corp., James R.
Line Material Co.
Pacific Elec. Mfg. Corp.
Schweitzer & Conrad, Inc.
Westinghouse Elec. & Mfg. Co.

Switches, Fuse
General Elec. Co.
Kearney Corp., James R.
Schweitzer & Conrad, Inc.

Switches, Heater
General Elec. Co.

Switches, High Tension
Bowie Switch Co.
James R. Kearney Corp.

Switches, Meter Test
General Elec. Co.
Square D Co.
Superior Switchboard & Devices Co.

Switches—Pressure and Temperature
Square D Co.

Switches, Safety
Colt's Patent Fire Arms Mfg. Co.
General Elec. Co.
McGill Mfg. Co.
Square D Co.
Westinghouse Elec. & Mfg. Co.

Switches, Thermostat Controlled
Colt's Patent Fire Arms Mfg. Co.
General Elec. Co.
Thermador Elec'l Mfg. Co.

Switches, Time
General Elec. Co.
Maydwell & Hartzell, Inc.
Sangamo Elec. Co.

Switchgear
Allis-Chalmers Mfg. Co.
General Electric Co.
I-T-E Circuit Breaker Co.
Westinghouse Elec. & Mfg. Co.

Tapes—Friction and Rubber
Clifton Mfg. Co.
Geo. E. Honn Co.

Telephone & Telegraph Hardware & Specialties
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Graybar Elec. Co., Inc.
Hubbard & Co.
Maydwell & Hartzell, Inc.

Telephone Systems—Private
American Automatic Elec. Sales Co.

Terminals, Cable
General Cable Corp.
General Elec. Co.

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Superior Switchboard & Devices Co.

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Mathias Klein & Sons
Maydwell & Hartzell, Inc.

Tools, Live Line
A. B. Chance Co.
James R. Kearney Corp.
Sangamo Elec. Co.

Tools, Tree Trimming
Bartlett Mfg. Co.

Transformers
Allis-Chalmers Mfg. Co.
American Transformer Co.
Gardner Elec. Mfg. Co.
General Elec. Co.
Jeffries Transformer Co.
Line Material Co.
Western Transformer Co.
Westinghouse Elec. & Mfg. Co.

Tubing, Elec'l Metallic
Aluminum Co. of America
Youngstown Sheet & Tube Co.

Turbines
Allis-Chalmers Mfg. Co.
Pelton Water Wheel Co.

Valves
Pelton Water Wheel Co.

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Easy Washing Machine Corp.
Edison Gen. Elec. Appliance Co.
General Elec. Co.
Little Giant, Inc., Ltd.
Norge Division, Borg-Warner Corp.
Westinghouse Elec. & Mfg. Co.

Wattmeters
General Elec. Co.
L. A. Nott
Roller-Smith Co.
Sangamo Elec. Co.
Westinghouse Elec. & Mfg. Co.
Weston Elec. Instrument Corp.

Water Wheels
Pelton Water Wheel Co.

Wire
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American Steel & Wire Co.
Columbia Steel Co.
Crescent Ins. Wire & Cable Co.
Crucible Steel Co.
General Cable Corp.
General Electric Co.
Hazard Ins. Wire Works
Indiana Steel & Wire Co.
C. E. Ingalls
Keystone Steel & Wire Co.
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The Okonite Company
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United States Steel Corp.
Westinghouse Elec. & Mfg. Co.
Wiremold Co.

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Graybar Elec. Co., Inc.
Irvington Varnish & Insulator Co.
Killark Elec. Mfg. Co.
McGill Mfg. Co.
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UNITED INDUSTRY CAMPAIGN

featuring

Electric Appliances for Christmas

Dec. 1-24 Watch for Electric Appliance Society

OFFICIAL BULLETIN

EW112-1237

★ ★ ★ ★ ★ ★ ★ ★ ★

All Merry All Happy All Light

Light up for the holiday season! Let the brightness and joyousness of your home overflow into your garden and suffuse your entire place with a spirit of warmth and cheer.

Lighted outdoor decorations are typical of the hospitable and generous spirit of California at holiday time. Share the loveliness of your house and grounds with your friends and neighbors and the world at large.

After the holidays you'll want good light for beauty and comfort the rest of the year too. And what lovelier gift could you give for Christmas than light?

So, to your home and your friends . . . . . Give Light This Year!

PACIFIC COAST ELECTRICAL BUREAU

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447 Sutter Street

CALIFORNIA

LOS ANGELES
601 West Fifth Street

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